كيف تسرع بإعداد مخططات الورشة

How to speed up shop drawing preparation

فكرة وإعداد
فريد توفيق منصور

الإهداء

إلى روح والدي رحمهما الله اللذين كان لهم الفضل في توجيهنا لأهمية العمل والإخلاص به ومحاولة التميز متوخيا مرضاة الله ورضاه

إلى زوجتى سناء وأبنائي جرير وأحمد وجواد وبناتي عفاف ولينه والذين يقدمون كل المساعدة والإخلاص وأسأل المولى أن يديم علينا جميعا الستر والعافيه

إلى زملائي من الفنيين (المساحين وحاسبي الكميات والرسامين) الذين يقاتلون لإثبات الذات وتحقيق القدرة على العمل بأبهى صوره أقدم هذا الكتاب عرفانا بجهودهم في مجال مشاريع الطرق والجسور تحديدا وهم الجنود المجهولين والذين يستحقون كل التقدير والأحترام

مقدمة

الحمدلله والصلاة والسلام على رسول الله وعلى آله وصحبه ومن والاه وبعد

هذه محاولة لكتاب **كيف تسرع بإعداد مخططات الورشة** . هو نتاج رحلة طويلة بمشاريع الطرق بالمملكة العربية السعودية وهو مجهود شخصي بالفكرة والتحضير وبمشاركة زملاء لي بالمكتب الفني لشركة لها الفضل في تطويري مهنيا (شركة محمد العلي السويلم) رحم الله الشيخ محمد العلي السويلم مؤسس وصاحب الشركة والعقل المدبر والذي كان يعاملنا لأبنائه ويزرع الأنتماء والأبداع في نفوسنا

الأمر الذي دفعنا لأن نقدم أفضل ما لدينا في تحضير وإعداد المخططات وتحضير حساب الكميات للمشاريع بدقة قدر الإمكان وبالسرعة المطلوبة نظرا لكثرة المشاريع وهنا كان لزاما علينا البحث بطرق غير تقليدية لتسريع العمل والحرص على الدقة بانجازه من ناحية ومن ناحية أخرى إعداد جداول كميات في فترة التحضيرات للمشروع بدقة لبيان العجز إن وجد أو الوفورات والذي أصبح لاحقا مطلب لا بد من تحمل المسئولية أمام المالك اذا تبين ان الجداول غير دقيقة او مدروسه

وهذا ما دفعني أن أفكر بطريقة مختلفة وأن ادرس كل البنود من خلال برنامج اكسل وتحديد المعطيات الأساسية المتوفرة من المخططات التصميمية القياسية للمشروع ومعالجتها رياضيا لضمان نتائج باسرع وقت واقل جهد واكثر دقه مع مراعاة طريقة القياس وطريقة الدفع طبقا للمواصفات وتحضير رسومات الورشة لها

وهذا الطرح تكون على حقبة زمنية حيث كل ما نحتاج الى بند بجدول الكميات يتم دراسته والتحقق من نتائجها وحفظه للاستخدام

وأهم بنود جدول الكميات التي تم تحضيرها هي :

(القسم الثاني (الأعمال الترابية

- 2090101 حفريات الإنشائية للجسور

- 2090102 حفريات إنشائية للعبارات

(القسم الثالث والرابع (طبقة ما تحت الأساس الحصوية والمنشآت البيتومينية

- 3030102 طبقة الأساس الحصوية

- 4020102 MC1 الطبقة التأسيسية البيتومينية

- 4050103 طبقة أساس من الخرسانة البيتومينية

- 4050104 طبقة السطح العليا البيتومينية

- 4050802 مركب كيماوي / معدل اسمنتي , بوليمر

(القسم الخامس (الخرسانة الحديد المنشآت

- اعمال الجدران الاستنادية

- أعمال الجسور

- أعمال العبارات الأنبوبية

- أعمال العبارات الصندوقية

- اعمال المزلقانات الأيرلندية

(القسم السادس (الأعمال المتفرقة

- 60202 مصائد الحيوانات

- 60703 أنبوب تصريف لميول جسم الطرق شوت

- 6060202 تكسية بالحجارة المغموسة بالمونة

- 60605 وقاية الميول بالخرسانة المسلحة

- 6-16-1 علامات حرم الطريق

- 6-2-5-1 مطبات صناعية سيراميك

- 5-12-01 غشاء عزل مائي

(القسم التاسع (أجهزة التحكم والمرور

- 9030301 خطوط مرور بيضاء

- 9030302 خطوط مرور صفراء

- (9030701 علامات رصف بارزة عاكسه نوع (أ

- 90501101 الواح المنيوم إشارات الطرق تركيب ارضي

- 90502 إشارات طرق علوية الواح المنيوم

- 9050301 حوامل إشارات (قابلة للانفصال) عمود واحد

- 9050302 حوامل إشارات (قابلة للانفصال) عمودين

- 9050303 حوامل إشارات (قابلة للانفصال) ثلاثة اعمدة

- 90504 حوامل إشارات (قابلة للانفصال) أنبوبية

- 9050501 حوامل إشارات - قنطرية

- 9050502 حوامل إشارات – معلقة

القسم الخاص بتغطية (حسابات الظهر SUPER ELEVATION)
تغطية لكل أنواع المنحنيات للطرق الزراعية والحضرية والسريعة بكافة المنحنيات البسيطة أو المنحنيات الانتقالية وبكل S-CURVE الحالات للمنحنيات الاتجاهات يسار الى يمين أو يمين الى يسار و تداخل المنحنيات بشكل سلس وسريع مع كافة البيانات والتفاصيل

وما شجعني على تحضير هذا الكتاب بالشكل الغير تقليدي (جداول اكسل) هو ملاحظاتي ومراقبتي بكيفية تسهيل البدء للفنيين والمهندسين حديثي التخرج وكيفية الاندماج السريع بالعمل بكل سهولة وقدرة على الإنتاج والتكيف مع طبيعة العمل المختلفة والقدرة على تحقيق مطالب الموقع بالوقت المناسب وتفاصيل كاملة تسهل على قسم التنفيذ سهولة وسرعة إنجاز العمل وبهذا يستطيع المهندس حديث التخرج او الفني ربط الخلفية العلمية مع الواقع العملي واندماجه السريع بالواقع العملي وبأقل وقت ممكن وبدون أي تأخير لسهولة ووضوح ملفات الأكسل حيث موضح باللون الأزرق المتغيرات المراد إدخالها بكل قسم من الأقسام السابقة الذكر وبعدها يحصل على النتائج من تفريد حديد وحساب كميات طبقا للمواصفات وطريقة الحساب وتزويد الموقع بها بكل اريحية وثقة وهذا لا يمنع من التحقق من النتائج قبل تزويد الموقع بها للأهمية وبالطبع بالتنسيق مع مدير الإدارة الهندسية ومهندس القسم بعمل تدقيق داخلي قبل الأرسال للموقع او المشتريات لضمان دقة وسرعة تحتمها طبيعة الأعمال السريعة

ولهذا لم يكتب اي دليل استخدام لأي جدول خاص بالأكسل هي واضحة ومن ثم الحصول على الخلاصات الرئيسية والفرعية IN PUT وبلون مختلف وتفاصيل حساب الكميات وتفريد الحديد وكميات كل قطر منه كما في العبارات الصندوقية مثلا وجدول لتحديد الكلفة كما في جدول طبقات الرصف البيتومينية

أرجو ان يكون هذا العمل والذي سيتم توزيعه مجانا بعون الله وفضله لزيادة الفائدة للجميع ولمن يرغب بالعمل بمشاريع الطرق تحديدا .
أمل ان يكون به الفائدة التي انشدها من خلال هذه الجداول لتبسيط الفكرة الهندسية الى أجراء سهل ودقيق وسريع التحضير لمزيد من الفائدة للجميع ان شاء الله العلي العظيم
هذه هي المحاولة الأولى وجاري العمل على تحويل هذه الأفكار بجداول الأكسل الى برنامج هندسي وخاصة لبرنامج العبارات الصندوقية ليتم زيادة الأستفادة منها على نطاق اشمل
وختاما ارجو الله أن تكون هذه المحاولة مفيده وتضيف شيئا ولو بسيط في مجال مشاريع الطرق
والله ولي التوفيق

فريد توفيق منصور
عمان في 18/10/2022

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الرابط أعلاه بالإضافة لل كيو ار كود هو موقع إلكتروني لتحميل الكتاب بي دي اف
بشكل مباشر وطلب ملفات الاكسل عبر التواصل من خلال الموقع

جدول الكميات

Bill of quantities

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

الملخص

رقم البند	الوصف	القيمة		الفرق (ر.س)	
		الأصلية	المعدلة	(+)	(-)
	الجزء الأول (عام)	1,000,000.00	1,000,000.00	0.00	0.00
	الجزء الثاني (الأعمال الترابية)	10,607,000.00	8,448,480.00	343,030.00	2,501,550.00
	الجزء الثالث (اطبقة ما تحت الأساس الحصوية وطبقات الأساس)	640,000.00	1,280,000.00	640,000.00	0.00
	الجزء الرابع (المنشآت البيتومينية)	4,500,000.00	4,678,621.00	786,800.00	608,179.00
	الجزء الخامس (الخرسانة ,الحديد , المنشآت)	11,636,000.00	12,110,690.00	737,300.00	262,610.00
	الجزء السادس (الأعمال المتفرقة)	260,000.00	474,200.00	243,000.00	28,800.00
	الجزء التاسع (أجهزة التحكم و المرور و مناطق العمل)	1,354,100.00	1,092,200.00	147,000.00	408,900.00
	الجزء العاشر (البنود المستحدثة)	0.00	912,909.00	912,909.00	0.00
	الأجمالي	29,997,100.00	29,997,100.00	3,810,039.00	3,810,039.00

المقاول : المهندس المشرف : الإعتماد :

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

رقم الجزء : الأول وصف الجزء : عـــــــام

رقم البند	الوصف	الوحدة	السعر	الكمية		القيمة		الفرق (ر.س)	
				الأصلية	المعدلة	الأصلية	المعدلة	(+)	(-)
10901	مجمع جهاز الأشراف - مؤقت - المكتب والسكن)	مقطوع	500000	1.00	1.00	500000.00	500000.00	0.00	0.00
10903	مختبر المشروع	مقطوع	250000	1.00	1.00	250000.00	250000.00	0.00	0.00
10904	أجهزة الحاسب الآلي وأجهزة المساحة	مقطوع	250000	1.00	1.00	250000.00	250000.00	0.00	0.00
	الأجمالي					1,000,000.00	1,000,000.00	0.00	0.00

المقاول : المهندس المشرف : الإعتماد :

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

رقم الجزء : الثاني وصف الجزء : الأعمال الترابية

رقم البند	الوصف	الوحدة	السعر	الكمية		القيمة		الفرق (ر.س)	
				الأصلية	المعدلة	الأصلية	المعدلة	(+)	(-)
20203	أزالة منشآت الجسور	م2	75	1000.00	1000.00	75000.00	75000.00	0.00	0.00
20301	حفريات الطريق	م3	6	395000.00	350000.00	2100000.00	2370000.00	270000.00	0.00
20501	أعمال الردم	م3	8	635431.25	900000.00	7200000.00	5083450.00	0.00	2116550.00
20601	طبقة القاعدة	م3	11	72000.00	107000.00	1177000.00	792000.00	0.00	385000.00
2090101	حفريات أنشائية - جسور	م3	10	12703.00	5400.00	54000.00	127030.00	73030.00	0.00
2090102	حفريات أنشائية - منشآت أخرى	م3	10	100.00	100.00	1000.00	1000.00	0.00	0.00
	الأجمالي					10,607,000.00	8,448,480.00	343,030.00	2,501,550.00

المقاول : المهندس المشرف : الإعتماد :

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت
رقم الجزء : الثالث
وصف الجزء : طبقة ما تحت الأساس الحصوية وطبقات الأساس

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

رقم البند	الوصف	الوحدة	السعر	الكمية		القيمة		الفرق (ر.س)	
				الأصلية	المعدلة	الأصلية	المعدلة	(+)	(-)
3030102	طبقة الأساس الحصوية - التدرج ("2) سماكة (20)سم	م3	40	16000.00	32000.00	640000.00	1280000.00	640000.00	0.00
	الأجمالي					640,000.00	1,280,000.00	640,000.00	0.00

المقاول : المهندس المشرف : الإعتماد :

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت
رقم الجزء : الرابع
وصف الجزء : المنشآت البيتومينية

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

رقم البند	الوصف	الوحدة	السعر	الكمية		القيمة		الفرق (ر.س)	
				الأصلية	المعدلة	الأصلية	المعدلة	(+)	(-)
4020102	الطبقة التأسيسية البيتومينية MC1	م2	2.5	280000.00	183928.40	700000.00	459821.00	0.00	240179.00
4050103	طبقة أساس من الخرسانة البيتومينية تدرج (2) صنف أ سماكة 8سم	م3	160	7500.00	10700.00	1200000.00	1712000.00	512000.00	0.00
4050104	طبقة السطح العليا البيتومينية تدرج (2) سماكة 5 سم	م3	160	11500.00	9200.00	1840000.00	1472000.00	0.00	368000.00
4050802	مركب كيماوي / معدل أسمنتي ، بوليمر	كيلو غرام	8	95000.00	129350.00	760000.00	1034800.00	274800.00	0.00
	الأجمالي					4,500,000.00	4,678,621.00	786,800.00	608,179.00

المقاول : المهندس المشرف : الإعتماد :

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت
رقم الجزء : الخامس
وصف الجزء : الخرسانه والحديد والمنشآت

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

رقم البند	الوصف	الوحدة	السعر	الكمية		القيمة		الفرق (ر.س)	
				الأصلية	المعدلة	الأصلية	المعدلة	(+)	(-)
50201	حديد التسليح درجة 60	طن	2700	1100.00	1369.00	2970000.00	3696300.00	726300.00	0.00
5030201	خرسانة المنشآت السفلية للجسور صنف (هـ)	م3	650	3400.00	3250.00	2210000.00	2112500.00	0.00	97500.00
5030301	خرسانة منشآت العبارات الصندوقية صنف (ج)	م3	650	200.00	5.00	130000.00	3250.00	0.00	126750.00
50308	أجهزة التحمل ،نوع دائري ثابت الحمولة 900 طن	وحدة	45000	2.00	2.00	90000.00	90000.00	0.00	0.00
50309	أجهزة التحمل ،نوع دائري منزلق الحمولة من 400 الى 750 طن	وحدة	35000	16.00	16.00	560000.00	560000.00	0.00	0.00
50310	أجهزة التحمل ، نوع دائري موجه الحمولة من 400 الى 900 طن	وحدة	35000	12.00	12.00	420000.00	420000.00	0.00	0.00
50314	فواصل من 50 ملم الى 100 ملم	م.ط	1200	80.00	72.20	96000.00	86640.00	0.00	9360.00
50401	حديد مسبق الأجهاد	طن	15000	105.00	113.52	1575000.00	1702800.00	127800.00	0.00
50403	قطع المنشآت المسبقة الأجهاد والمصبوبة بالموقع	م3	800	4000.00	3854.00	3200000.00	3083200.00	-116800.00	0.00
50501	تجهيز وتصنيع وتركيب الحديد الأنشائي (لمداخل ومخارج العبارات)	طن	10000	10.00	10.00	100000.00	100000.00	0.00	0.00
51001	حواجز جسور	م.ط	250	200.00	200.00	50000.00	50000.00	0.00	0.00
51201	غشاء عزل مائي	م2	50	4700.00	4120.00	235000.00	206000.00	0.00	29000.00
	الأجمالي					11,636,000.00	12,110,690.00	737,300.00	262,610.00

المقاول : المهندس المشرف : الإعتماد :

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت
رقم الجزء : السادس وصف الجزء : الأعمال المتفرقة

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

رقم البند	الوصف	الوحدة	السعر	الكمية الأصلية	الكمية المعدلة	القيمة الأصلية	القيمة المعدلة	الفرق (ر.س) (+)	الفرق (ر.س) (-)
60605	وقاية الميول بالخرسانة المسلحة شاملا حديد التسليح	م2	100	600.00	312.00	60000.00	31200.00	0.00	28800.00
60806	عبارة انبوبية خرسانية مسلحة مسبقة الصنع قطر (800) ملم	م.ط	1000	200.00	443.00	200000.00	443000.00	243000.00	0.00
	الأجمالي					260,000.00	474,200.00	243,000.00	28,800.00

المقاول : المهندس المشرف : الإعتماد :

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت
رقم الجزء : التاسع وصف الجزء : أجهزة التحكم بالمرور ومناطق العمل

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

رقم البند	الوصف	الوحدة	السعر	الكمية الأصلية	الكمية المعدلة	القيمة الأصلية	القيمة المعدلة	الفرق (ر.س) (+)	الفرق (ر.س) (-)
9030301	خطوط مرور بيضاء عاكسة بلاستيكية حرارية	م2	18	1750.00	1200.0000	31500.00	21600.00	0.00	9900.00
9030302	خطوط مرور صفراء عاكسة بلاستيكية حرارية	م2	18	6300.00	6300.00	113400.00	113400.00	0.00	0.00
9030701	علامات رصف بارزة عاكسة نوع (أ)	وحدة	18	8400.00	5400.00	151200.00	97200.00	0.00	54000.00
9050101	الواح المومنيوم اشارات الطرق تركيب أرضي	م2	600	100.00	25.00	60000.00	15000.00	0.00	45000.00
90502	أشارات طرق علوية - الواح المنيوم	م2	700	100.00	310.00	70000.00	217000.00	147000.00	0.00
9050301	حوامل أشارات (قابلة للأنفصال) عمود واحد	كيلو غرام	10	4000.00	4000.00	40000.00	40000.00	0.00	0.00
9050302	حوامل أشارات (قابلة للأنفصال) عمودابن	كيلو غرام	10	8000.00	8000.00	80000.00	80000.00	0.00	0.00
9050303	حوامل أشارات (قابلة للأنفصال) ثلاثة أعمدة	كيلو غرام	10	10000.00	10000.00	100000.00	100000.00	0.00	0.00
90504	حوامل أشارات (قابلة للأنفصال) أنبوبية	وحدة	400	20.00	20.00	8000.00	8000.00	0.00	0.00
9050501	حوامل أشارات - قنطرية	طن	10000	30.00	0.00	300000.00	0.00	0.00	300000.00
9050502	حوامل أشارات - معلقة	طن	10000	40.00	40.00	400000.00	400000.00	0.00	0.00
	الأجمالي					1,354,100.00	1,092,200.00	147,000.00	408,900.00

المقاول : المهندس المشرف : الإعتماد :

بسم الله الرحمن الرحيم
المملكة العربية السعودية
وزارة النقل
مشروع : طريق القصيم / حائل - الجزء الثالث

أسم المقاول : شركة محمد العلي السويلم
الإشراف : سعود كونسلت
رقم الجزء : العاشر وصف الجزء : البنود المستحدثة

جدول الكميات المعدل رقم : 1
تاريخـــــة : 1425/9/15 هجري

رقم البند	الوصف	الوحدة	السعر	الكمية الأصلية	الكمية المعدلة	القيمة الأصلية	القيمة المعدلة	الفرق (ر.س) (+)	الفرق (ر.س) (-)
1-6-9	تمديد مواسير من البلاستيك بي في سي مقاس 3*150ملم للأنارة	م.ط	133	0.00	410.00	0.00	54530.00	54530.00	0.00
2-6-9	تمديد مواسير من البلاستيك بي في سي مقاس 4*150ملم للأنارة	م.ط	166	0.00	150.00	0.00	24900.00	24900.00	0.00
3-6-9	تمديد انابيب من البلاستيك غير اللدن قطر 250 ملم للري	م.ط	221	0.00	200.00	0.00	44200.00	44200.00	0.00
3-6-9	أزالة المباني القائمة والمظلات والهناجر والخزانات الأرضية	م2	110	0.00	2855.00	0.00	314050.00	314050.00	0.00
4-6-9	أزالة الأسوار القائمة التي تعترض العمل	م.ط	35	0.00	1250.00	0.00	43750.00	43750.00	0.00
5-6-9	حماية الميول بالأحجار المغموسة بالمونة لزوم الحفرة الأمتصاصية	م3	140	0.00	1550.00	0.00	217000.00	217000.00	0.00
6-6-9	حواجز خرسانية نيوجرسي ذات وجه واحد	م.ط	312	0.00	500.00	0.00	156000.00	156000.00	0.00
7-6-9	بردورات خرسانية لا يمكن الصعود عليها	م.ط	37	0.00	560.00	0.00	20720.00	20720.00	0.00
9-6-9	غرف سحب مع غطاء شديد الأحتمال	عدد	4311	0.00	8.00	0.00	34488.00	34488.00	0.00
11-6-9	فتحات تصريف للجزيرة الوسطية على العبارات الانبوبية	عدد	3271	0.00	1.00	0.00	3271.00	3271.00	0.00
	الأجمالي الفرعي للقسم (10) البنود المستحدثة					0.00	912,909.00	912,909.00	0.00

المقاول : المهندس المشرف : الإعتماد :

SEC. 2

الأعمال الترابية

PART:2 EARTH WORKS

حفريات أنشائية للعبارات والجسور

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حفريات إنشائية للجسور

Structural Excavation – Bridges

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : BURAIDAH RING ROAD — Page: __1_ of _1_
Item : UNCLASS. STRUCT. EXCAV. FOR BRIDGE — Drwg. No. _____

UNCLASS. STRUCT. EXCAV. FOR BRIDGE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
	UNCLASS. STRUCT. EXCAV. FOR BRIDGE	M³	766.190	Page: __1_ of _3_
	Grand total	M³	766.190	

Suprv'g. Consultant : DAR AL HANDASAH	BURAIDAH RING ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : BURAIDAH RING ROAD — Page: __1_ of _3_
Item : UNCLASS. STRUCT. EXCAV. FOR BRIDGE — Drwg. No. _____

SUMMARY

NO.	DESCRIPTION	UNIT	SUB-TOTAL	SIDES	TOTAL
1	ABUTMENT 1	M³	439.110	1	439.110
2	PIER 1	M³	327.080	1	327.080
	GRAND TOTAL =				766.190

Suprv'g. Consultant : DAR AL HANDASAH	BURAIDAH RING ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

CONSULTANT: DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ...2..... of ...3.....

Project: BURAIDAH RING ROAD

Drwg. No. .....

Item: UNCLASS. STRUCT. EXCAV. FOR BRIDGE

Date .....

ABUTMENT 1

Abutment 1 = 8.00 x 15.00

Level 1 = 594.500

Formation Level = 594.425

Corner Elevations:

1.) = 597.420

2.) = 597.900

3.) = 597.920 specs.

4.) = 597.550

INTERCHANGE 1 - A BRIDGE 1L ABUTMENT 1

LENGTH m	WIDTH m	HEIGHTm
15.60	8.60	3.273

FOOTING AREA m^2	VOLUME m^2
134.160	439.110

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL HANDASAH	BURAIDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ...2..... of ...3.....

Project: BURAIDAH RING ROAD

Drwg. No. .....

Item: UNCLASS. STRUCT. EXCAV. FOR BRIDGE

Date .....

ABUTMENT 1

Abutment 1 = 8.00 x 15.00

Level 1 = 594.500

Formation Level = 594.425

Corner Elevations:

1.) = 597.420

2.) = 597.900

3.) = 597.920 specs.

4.) = 597.550

INTERCHANGE 1 - A BRIDGE 1L ABUTMENT 1

LENGTH m	WIDTH m	HEIGHTm
15.60	8.60	3.273

FOOTING AREA m^2	VOLUME m^2
134.160	439.110

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL HANDASAH	BURAIDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

الحفريات الأنشائية – الأخرى

Structural Excavation – Other Structure

العبارات الأنبوبية

Suprv'g. Consultant : SAUDCONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : **Qassim - Hail Road (I/C 3)** Page: _1__ of _1__

Item : **2090102 STRUCTURAL EXCAVATION** Drwg. No. _____

(RCPC 1 x 800mm. Ø, TOE WALL)

2090102 STRUCTURAL EXCAVATION (RCPC 1 x 800mm. Ø, TOE WALL)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
2090102	STRUCTURAL EXCAVATION	M^3	22.193	page 1 of 1
	Grand total	M^3	22.193	

Contractor : M. A. AL SWAILEM CO.	QASSIM - HAIL ROAD Interchange No. 3	Suprv'g. Consultant : SAUD CONSULT
Quantity Surveyor / Proj. Manager		Quantity Surveyor / Res. Engineer

Suprv'g Consultant: ITAL CONSULT	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: DOUBLING JEDDAH - JIZAN ROAD

Item : 2090102 STRUCTURAL EXCAVATION FOR OTHERS

Page 1 of 1

Drwg. No.

Date:

2090102 STRUCTURAL EXCAVATION FOR OTHERS

NOTE:
A1 & A2 & WIDTH = CONSTANT

Structure: RCPC 1 X Ø 1000 mm.

LOCATION	A1	A2	WIDTH	VOLUME(m³)
1+150 Main Road	0.963	0.413	3.228	4.439
0+225 Ramp 1	0.963	0.413	3.228	4.439
0+540 Ramp 2	0.963	0.413	3.228	4.439
0+900 Ramp 2	0.963	0.413	3.228	4.439
0+225 Loop 1	0.963	0.413	3.228	4.439
			TOTAL VOLUME	22.193

Contractor: M. A. AL SWAILEM CO.	DOUBLING JEDDAH - JIZAN ROAD	Consultant: ITAL CONSULT
Q.S. Proj. Manager		Q.S. Res. Engineer

العبارات الصندوقية

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD** Page: _1__ of _1__

Item : ***2090101*** **STRUCTURAL EXCAVATION** Drwg. No. _____

(For R.C.B.C.)

2090101 STRUCTURAL EXCAVATION
(For R.C.B.C.)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
2090101	STRUCTURAL EXCAVATION	M^3	954.004	page 1 of 1
	Grand total	M^3	954.004	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : DOUBLING JEDDAH-JIZAN ROAD — Page: ___ of __

Item : 2090101 STRUCTURAL EXCAVATION (For R.C.B.C.) — Drwg. No. _____

2090101 STRUCTURAL EXCAVATION

(For R.C.B.C.)

SUMMARY

NO.	STATION	QUANTITY (M³.)	REMARKS
1	2+050.000	954.004	
2			
3			
4			
5			
6			
7			
	GRAND TOTAL =	954.004	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD** Page: ___ of __

Item : **2090101** **STRUCTURAL EXCAVATION** Drwg. No. _____

(For R.C.B.C.)

Culvert Bottom Slab Top Surface Elevation

Offset	-24.334	-17.154	0.000	17.924	25.104
Elevation	961.327	961.182	960.834	960.471	960.325

P L A N

CULVERT @ Sta. **2+050.000**

R.C.B.C. 2 (4 - 3.50 x 3.00) Skew 90 °

Natural Ground Levels

Offset	-30.000	-20.000	-10.000	0.000	10.000	20.000	30.000
Elevation	961.625	961.345	961.000	960.828	960.500	960.650	960.425

CULVERT DIMENSIONS

T1	W1	W2	X	Barrel Length	Apron Inlet	Apron Outlet
0.480	0.440	0.320	31.680	35.078	6.880	7.180

SECTION

STRUCTURAL EXCAVATION COMPUTATION

LOCATION	Depth	Width	Area	Distance	Volume	Remarks
Sect. A-A	0.459	32.280	14.817	6.330	86.228	Inlet Apron
Sect. B-B	0.385	32.280	12.428			
Sect. C-C	0.615	32.280	19.852	17.154	320.887	Barrel Left
Sect. D-D	0.544	32.280	17.560	17.924	359.302	Barrel Right
Sect. E-E	0.698	32.280	22.531			
Sect. F-F	0.468	32.280	15.107	6.930	111.626	Outlet Aprn
Sect. G-G	0.530	32.280	17.108			
T.W. Inlet	1.139	32.280	36.767	0.550	20.222	
T.W. Outlet	2.210	32.280	71.339	0.550	39.236	
End Key Bl.	0.170	0.900	0.153	31.680	9.694	
O.W.Key Bl.	0.170	0.690	0.117	12.360	2.900	
I.W.Key Bl.	0.170	0.620	0.105	12.360	3.908	
				SUB-TOTAL =	**954.004**	**m³**

SECTION @ APRON

Suprv'g. Consultant :		DOUBLING JEDDAH-JIZAN ROAD	Contractor :	
ITAL CONSULT			***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD** Page: ___ of __

Item : **2090101** **STRUCTURAL EXCAVATION** Drwg. No. _____

Culvert Bottom Slab Top Surface Elevation

Offset	-24.334	-17.154	0.000	17.924	25.104
Elevation	961.327	961.182	960.834	960.471	960.325

P L A N

CULVERT @ Sta. **2+050.000**

R.C.B.C. 4 - 3.50 x 3.00 Skew 60 °

Natural Ground Levels

Offset	-30.000	-20.000	-10.000	0.000	10.000	20.000	30.000
Elevation	961.625	961.345	961.000	960.828	960.500	960.650	960.425

CULVERT DIMENSIONS

T1	W1	W2	X	Barrel Length	Apron Inlet	Apron Outlet
0.480	0.440	0.360	31.698	35.078	6.880	7.180

SECTION

STRUCTURAL EXCAVATION COMPUTATION

LOCATION	Depth	Width	Area	Distance	Volume	Remarks
Sect. A-A	0.459	32.298	14.825	6.330	86.276	Inlet Apron
Sect. B-B	0.385	32.298	12.435			
Sect. C-C	0.615	32.298	19.863	17.154	321.066	Barrel Left
Sect. D-D	0.544	32.298	17.570			
Sect. E-E	0.698	32.298	22.544	17.924	359.503	Barrel Right
Sect. F-F	0.468	32.298	15.115	6.930	111.689	Outlet Aprn
Sect. G-G	0.530	32.298	17.118			
T.W. Inlet	1.139	37.294	42.478	0.550	23.363	
T.W. Outlet	2.210	37.294	82.421	0.550	45.331	
End Key Bl.	0.170	1.039	0.177	31.698	11.200	
O.W.Key Bl.	0.170	0.797	0.135	12.360	3.348	
I.W.Key Bl.	0.170	0.762	0.130	12.360	4.804	
				SUB-TOTAL =	**966.581**	**m³**

SECTION @ APRON

Suprv'g. Consultant :		Contractor :
ITAL CONSULT	***DOUBLING JEDDAH-JIZAN ROAD***	***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD** Page: ___ of __

Item : **STRUCTURAL EXCAVATION** Drwg. No. _____

Culvert Bottom Slab Top Surface Elevation

Offset	-24.334	-17.154	0.000	17.924	25.104
Elevation	961.327	961.182	960.834	960.471	960.325

P L A N

CULVERT @ Sta. **2+050.000**

R.C.B.C. 4 - 3.50 x 3.00 Skew 90 °

Natural Ground Levels

Offset	-30.000	-20.000	-10.000	0.000	10.000	20.000	30.000
Elevation	961.625	961.345	961.000	960.828	960.500	960.650	960.425

CULVERT DIMENSIONS

T1	W1	W2	X	Barrel Length	Apron Inlet	Apron Outlet
0.480	0.440	0.360	31.698	35.078	6.880	7.180

SECTION

STRUCTURAL EXCAVATION COMPUTATION

LOCATION	Depth	Width	Area	Distance	Volume	Remarks
Sect. A-A	0.459	32.298	14.825	6.330	86.276	Inlet Apron
Sect. B-B	0.385	32.298	12.435			
Sect. C-C	0.615	32.298	19.863	17.154	321.066	Barrel Left
Sect. D-D	0.544	32.298	17.570			
Sect. E-E	0.698	32.298	22.544	17.924	359.503	Barrel Right
Sect. F-F	0.468	32.298	15.115	6.930	111.689	Outlet Aprn
Sect. G-G	0.530	32.298	17.118			
T.W. Inlet	1.139	32.298	36.787	0.550	20.233	
T.W. Outlet	2.210	32.298	71.379	0.550	39.258	
End Key Bl.	0.170	0.900	0.153	31.698	9.700	
O.W.Key Bl.	0.170	0.690	0.117	12.360	2.900	
I.W.Key Bl.	0.170	0.660	0.112	12.360	4.160	
				SUB-TOTAL =	**954.785**	**m³**

SECTION @ APRON

Suprv'g. Consultant :		Contractor :
ITAL CONSULT	***DOUBLING JEDDAH-JIZAN ROAD***	***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD** Page: ___ of __

Item : **STRUCTURAL EXCAVATION** Drwg. No. _____

Culvert Bottom Slab Top Surface Elevation

Offset	-24.334	-17.154	0.000	17.924	25.104
Elevation	961.327	961.182	960.834	960.471	960.325

P L A N

CULVERT @ Sta. **2+050.000**

R.C.B.C. 4 - 3.50 x 3.00 Skew 60 °

Natural Ground Levels

Offset	-30.000	-20.000	-10.000	0.000	10.000	20.000	30.000
Elevation	961.625	961.345	961.000	960.828	960.500	960.650	960.425

CULVERT DIMENSIONS

T1	W1	W2	X	Barrel Length	Apron Inlet	Apron Outlet
0.480	0.440	0.360	31.698	35.078	6.880	7.180

SECTION

STRUCTURAL EXCAVATION COMPUTATION

LOCATION	Depth	Width	Area	Distance	Volume	Remarks
Sect. A-A	0.459	32.298	14.825	6.330	86.276	Inlet Apron
Sect. B-B	0.385	32.298	12.435			
Sect. C-C	0.615	32.298	19.863	17.154	321.066	Barrel Left
Sect. D-D	0.544	32.298	17.570			
Sect. E-E	0.698	32.298	22.544	17.924	359.503	Barrel Right
Sect. F-F	0.468	32.298	15.115	6.930	111.689	Outlet Aprn
Sect. G-G	0.530	32.298	17.118			
T.W. Inlet	1.139	37.294	42.478	0.550	23.363	
T.W. Outlet	2.210	37.294	82.421	0.550	45.331	
End Key Bl.	0.170	1.039	0.177	31.698	11.200	
O.W.Key Bl.	0.170	0.797	0.135	12.360	3.348	
I.W.Key Bl.	0.170	0.762	0.130	12.360	4.804	
				SUB-TOTAL =	**966.581**	**m³**

SECTION @ APRON

Suprv'g. Consultant :		Contractor :
ITAL CONSULT	***DOUBLING JEDDAH-JIZAN ROAD***	***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING JEDDAH - JIZAN ROAD** Page: ___ of __

Item : **STRUCTURAL EXCAVATION** Drwg. No. _____

LONGITUDINAL SECTION

Culvert Bottom Slab Top Surface Elevation

Offset	-21.251	-16.503	0.000	16.923	21.540
Elevation	34.559	34.575	34.633	34.692	34.708

P L A N

CULVERT @ Sta. **32+088.500**

R.C.B.C. 1 - 1.30 x 0.95 Skew 90 °

Natural Ground Levels

Offset	-33.150	-23.150	-13.150	0.000	1.130	21.130	41.130
Elevation	34.617	34.589	34.587	34.637	34.637	35.417	35.307

T1	W1	W2	X	Barrel Length	Apron Inlet	Apron Outlet
0.260	0.22	0	1.740	33.426	4.617	4.748

SECTION

LOCATION	Depth	Width	Area	Distance	Volume	Remarks
Sect. A-A	0.345	2.340	0.807	4.067	3.226	Inlet Apron
Sect. B-B	0.333	2.340	0.779			
Sect. C-C	0.343	2.340	0.803	16.503	13.072	Barrel Inlet
Sect. D-D	0.334	2.340	0.782			
Sect. E-E	0.891	2.340	2.085	16.923	24.255	Barrel Outlet
Sect. F-F	0.881	2.340	2.062	4.498	10.041	Outlet Aprn
Sect. G-G	1.027	2.340	2.403			
T.W. Inlet	1.025	2.340	2.399	0.550	1.319	
T.W. Outlet	2.707	2.340	6.334	0.550	3.484	
End Key Bl.	0.170	0.900	0.153	1.740	0.532	
O.W.Key Bl.	0.170	0.470	0.080	8.105	1.295	
I.W.Key Bl.	0.170	0.300	0.051	8.105	0.000	
				SUB-TOTAL =	**57.225**	**m³**

SECTION @ APRON

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH - JIZAN ROAD***	Contractor : ***M. A. AL SWAILEM CO.***

SEC.4&3

طبقة الأساس الحصوية

PART 3: AGGREGATE SUBBASE AND BASE COURSES

طبقات الرصف البيتومينية

PART:4 BITUMINOUS CONSTRUCTION

طبقة التأسيس البيتومينية , طبقة الأساس البيتومينية و طبقة السطح البيتومينية

BITUMINOUS PRIME COAT ,BITUMINOUS BASC COURSES&BITUMINOUS WAERING CO.

book.engineering-services-center.com

FINAL QUANTITIES

الكميات النهائية

Project : EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF — Page: __1_ of _1_

Item : 20601 SUBGRADE — Drwg. No. _____

20601 SUBGRADE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
20601	SUBGRADE	M³	6,333.750	page 1 of 2
	Grand total	M³	6,333.750	

FINAL QUANTITIES
الكميات النهائية

Project : EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF — Page: __1_ of _1_

Item : 4020102 PRIME COAT (mc1) — Drwg. No. _____

4020102 PRIME COAT (mc1)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4020102	PRIME COAT (mc1)	M³	26,381.250	page 1 of 2
	Grand total	M³	26,381.250	

Suprv'g. Consultant : SAUD CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF — Page: __1_ of _1_

Item : 4050301 BIT. WEARING COURSE — Drwg. No. _____

4050301 BIT. WEARING COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050301	BIT. WEARING COURSE	M²	1,311.563	page 1 of 2
	Grand total	M²	1,311.563	

Suprv'g. Consultant : SAUD CONSULT	EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
SAUD CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF** Page: __1_ of _2_

Item : **20601** **SUBGRADE** Drwg. No. _____

4020102 **PRIME COAT (mc1)**

4050301 **BIT. WEARING COURSE**

SUMMARY

NO.	DESCRIPTION	UNIT	SUB-TOTAL	REMARKS
1	SUBGRADE	M^3	6,333.750	
2	PRIME COAT (mc1)	M^2	26,381.250	
3	BIT. WEARING COURSE	M^3	1,311.563	

Suprv'g. Consultant :			Contractor :	
SAUD CONSULT		***EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF***	***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : SAUD CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF — Page: 2 of 2

Item : 20601 SUBGRADE — Drwg. No. _____

4020102 PRIME COAT (mc1)

4050301 BIT. WEARING COURSE

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUB-GRADE (0.20 W +0.9725) x D (Cu. m.)	PRIME COAT (W + 3.1000) x D (Sq.. m).	BIT. WEARING COURSE (0.05 W +0.1525) x D (Cu. m).		REMARKS
LINK No. 1								
0+000.000		6.500						
	500.000		6.500	1,136.250	4,800.000	238.750		
0+500.000		6.500						
	200.000		6.900	470.500	2,000.000	99.500		
0+700.000		7.300						
	300.000		7.300	729.750	3,120.000	155.250		
1+000.000		7.300						
	100.000		6.900	235.250	1,000.000	49.750		
1+100.000		6.500						
	400.000		6.500	909.000	3,840.000	191.000		
1+500.000		6.500						
	100.000		5.075	198.750	817.500	40.625		
1+600.000		3.650						
	900.000		3.650	1,532.250	6,075.000	301.500		
2+500.000		3.650						
	50.000		5.075	99.375	408.750	20.313		
2+550.000		6.500						
	450.000		6.500	1,022.625	4,320.000	214.875		
3+000.000		6.500						
TOTAL				6,333.750	26,381.250	1,311.563		

Suprv'g. Consultant : SAUD CONSULT	EXT'N OF SKAKA-MAHIJA TO HAIL AL	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : SAUD CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION

Project : EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF

Page: __1_ of _1_

Item : 20601 SUBGRADE

Drwg. No. _____

4020102 PRIME COAT (mc1)

4050301 BIT. WEARING COURSE

SUMMARY

NO.	DESCRIPTION	UNIT	TOTAL	LEFT / RIGHT	TOTAL	RATE/UNIT	VALUE (S.R.)
1	SUBGRADE	M³	6,333.750	1	6,333.750	12.620	79,931.925
2	PRIME COAT (mc1)	M³	26,381.250	1	26,381.250	0.820	21,632.625
3	BIT. WEARING COURSE	M³	1,311.563	1	1,311.563	156.470	205,220.184
					GRAND TOTAL (S.R.) =		306,784.734

Suprv'g. Consultant : SAUD CONSULT	EXT'N OF SKAKA-MAHIJA TO HAIL AL JOUF	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES

الكميات النهائية

Project : DOUBLING TAIF AL BAHA-ABHA ROAD — Page: __1_ of _1_

Item : *20601* SUBGRADE — Drwg. No. _____

20601 SUBGRADE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
20601	SUBGRADE	M³	167,881.000	Page: __1_ of _2_
	Grand total	M³	167,881.000	

Suprv'g. Consultant : *ITAL CONSULT*	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : DOUBLING TAIF AL BAHA-ABHA ROAD — Page: __1_ of _1_
Item : *3030101* AGGREGATE BASE COURSE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
3030101	AGGREGATE BASE COURSE	M³	81,094.000	Page: __1_ of _2_
	Grand total	M³	81,094.000	

Suprv'g. Consultant : *ITAL CONSULT*	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_
Item : ***4020102*** **PRIME COAT (mc1)** Drwg. No. _____

4020102 PRIME COAT (mc1)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4020102	PRIME COAT (mc1)	M²	419,070.000	Page: __1_ of _2_
	Grand total	M²	419,070.000	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_
Item : ***4050101*** **BIT. BASE COURSE** Drwg. No. _____

4050101 BIT. BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050101	BIT. BASE COURSE	M³	32,056.800	Page: __1_ of _2_
	Grand total	M³	32,056.800	

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_
Item : ***4050301*** **BIT. WEARING COURSE** Drwg. No. _____

4050301 **BIT. WEARING COURSE**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050301	BIT. WEARING COURSE	M³	21,116.700	Page: __1_ of _2_
	Grand total	M³	21,116.700	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائيه

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : ***4050802*** **POLYMER** Drwg. No. _____

4050802 **POLYMER**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050802	POLYMER	Kgs.	308,088.243	Page: __1_ of _2_
	Grand total	Kgs.	308,088.243	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _2_

Item : 20601 **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

4050802 **POLYMER**

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	167,881.000	
3030101	AGGREGATE BASE COURSE	M^3	81,094.000	
4020102	PRIME COAT (mc1)	M^2	419,070.000	
4050101	BIT. BASE COURSE	M^3	32,056.800	
4050301	BIT. WEARING COURSE	M^3	21116.700	
4050802	POLYMER	KGS.	308,088.243	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF AL BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: _2__ of __2__

Item : ***20601*** **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

4050802 **POLYMER**

Wt. of Polymer per M³ of BBC in kg/m³
= 2.30x 0.048 x1000 x0.05 = 5.52
Wt. of Polymer per M³ of BWC in kg/m³
= 2.30x 0.054 x1000 x0.05 = 6.21

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUB-GRADE (0.30 W +2.6290) x D (Cu. m.)	AGG. BASE COURSE (0.20 W +0.8460) x D (Cu. m).	PRIME COAT (W + 4.63) x D (Sq.. m).	BIT. BASE COURSE (0.08 W +0.3272) x D (Cu. m).	BIT. WEARING COURSE (0.05 W +0.2363) x D (Cu. m).	POLYMER BBC=5.52kgs/m³ & BWC=6.21kgs/m³
Left Side									
10+000.000		7.300							
	10000.000		7.300	48,190.000	23,060.000	119,300.000	9,112.000	6,013.000	87,638.970
20+000.000		7.300							
	1000.000		9.125	5,366.500	2,671.000	13,755.000	1,057.200	692.550	10,136.480
21+000.000		10.950							
	4000.000		9.125	21,466.000	10,684.000	55,020.000	4,228.800	2,770.200	40,545.918
25+000.000		7.300							
	2000.000		6.900	9,398.000	4,452.000	23,060.000	1,758.400	1,162.600	16,926.114
27+000.000		6.500							
Right Side									
10+000.000		6.500							
	10000.000		6.900	46,990.000	22,260.000	115,300.000	8,792.000	5,813.000	84,630.570
20+000.000		7.300							
	1000.000		9.125	5,366.500	2,671.000	13,755.000	1,057.200	692.550	10,136.480
21+000.000		10.950							
	4000.000		9.125	21,466.000	10,684.000	55,020.000	4,228.800	2,770.200	40,545.918
25+000.000		7.300							
	2000.000		7.300	9,638.000	4,612.000	23,860.000	1,822.400	1,202.600	17,527.794
27+000.000		7.300							
SUB-TOTAL				167,881.000	81,094.000	419,070.000	32,056.800	21,116.700	308,088.243

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF AL BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : 20601 **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

4050802 **POLYMER**

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	RATE/UNIT	VALUE (S.R.)
20601	SUBGRADE	M³	167,881.000	12.620	2,118,658.220
3030101	AGGREGATE BASE COURSE	M³	81,094.000	33.690	2,732,056.860
4020102	PRIME COAT (mc1)	M³	419,070.000	0.820	343,637.400
4050101	BIT. BASE COURSE	M³	32,056.800	146.920	4,709,785.056
4050301	BIT. WEARING COURSE	M³	21,116.700	156.470	3,304,130.049
4050802	POLYMER	KGS.	308,088.243	5.000	1,540,441.215
			GRAND TOTAL (S.R.)		14,748,708.800

Suprv'g. Consultant : *ITAL CONSULT*	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : ***20601*** **SUBGRADE** Drwg. No. _____

20601 SUBGRADE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
20601	SUBGRADE	M³	169,567.000	Page: __1_ of _2_
	Grand total	M³	169,567.000	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_
Item : ***3030101*** **AGGREGATE BASE COURSE** Drwg. No. _____

3030101 AGGREGATE BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
3030101	AGGREGATE BASE COURSE	M³	88,848.000	Page: __1_ of _2_
	Grand total	M³	88,848.000	

4020102 PRIME COAT (mc1)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4020102	PRIME COAT (mc1)	M²	434,210.000	Page: __1_ of _2_
	Grand total	M²	434,210.000	

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : DOUBLING TAIF AL BAHA-ABHA ROAD — Page: __1_ of _1_
Item : *4050101* BIT. BASE COURSE — Drwg. No. _____

4050101 BIT. BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050101	BIT. BASE COURSE	M³	34,628.000	Page: __1_ of _2_
	Grand total	M³	34,628.000	

Suprv'g. Consultant : *ITAL CONSULT*	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : ***4050301*** **BIT. WEARING COURSE** Drwg. No. _____

4050301 **BIT. WEARING COURSE**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050301	BIT. WEARING COURSE	M³	21,533.700	Page: __1_ of _2_
	Grand total	M³	21,533.700	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائيه

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : ***4050802*** **POLYMER** Drwg. No. _____

4050802 **POLYMER**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050802	POLYMER	Kgs.	324,870.837	Page: __1_ of _2_
	Grand total	Kgs.	324,870.837	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : DOUBLING TAIF AL BAHA-ABHA ROAD — Page: __1_ of _2_

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

4050802 POLYMER

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	169,567.000	
3030101	AGGREGATE BASE COURSE	M^3	88,848.000	
4020102	PRIME COAT (mc1)	M^2	434,210.000	
4050101	BIT. BASE COURSE	M^3	34,628.000	
4050301	BIT. WEARING COURSE	M^3	21533.700	
4050802	POLYMER	KGS.	324,870.837	

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING TAIF AL BAHA-ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: _2__ of __2__

Item : ***20601*** **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

4050802 **POLYMER**

Wt. of Polymer per M³ of BBC in kg/m³
= 2.30x 0.048 x1000 x0.05 = 5.52
Wt. of Polymer per M³ of BWC in kg/m³
= 2.30x 0.054 x1000 x0.05 = 6.21

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUB-GRADE (0.30 W +2.5630) x D (Cu. m.)	AGG. BASE COURSE (0.20 W +0.9970) x D (Cu. m).	PRIME COAT (W + 4.69) x D (Sq.. m).	BIT. BASE COURSE (0.08 W +0.3720) x D (Cu. m).	BIT. WEARING COURSE (0.05 W +0.2293) x D (Cu. m).	POLYMER BBC=5.52kgs/m³ & BWC=6.21kgs/m³
Left Side									
10+000.000		7.300	-				-		
	10000.000		7.750	48,880.000	25,470.000	124,400.000	9,920.000	6,168.000	93,061.680
20+000.000		8.200							
	1000.000		9.575	5,435.500	2,912.000	14,265.000	1,138.000	708.050	10,678.751
21+000.000		10.950							
	4000.000		9.125	21,202.000	11,288.000	55,260.000	4,408.000	2,742.200	41,361.222
25+000.000		7.300							
	2000.000		6.900	9,266.000	4,754.000	23,180.000	1,848.000	1,148.600	17,333.766
27+000.000		6.500							
Right Side									
10+000.000		7.300							
	10000.000		7.750	48,880.000	25,470.000	124,400.000	9,920.000	6,168.000	93,061.680
20+000.000		8.200							
	1000.000		9.575	5,435.500	2,912.000	14,265.000	1,138.000	708.050	10,678.751
21+000.000		10.950							
	4000.000		9.125	21,202.000	11,288.000	55,260.000	4,408.000	2,742.200	41,361.222
25+000.000		7.300							
	2000.000		6.900	9,266.000	4,754.000	23,180.000	1,848.000	1,148.600	17,333.766
27+000.000		6.500							
SUB-TOTAL				169,567.000	88,848.000	434,210.000	34,628.000	21,533.700	324,870.837

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF AL BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : 20601 **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

4050802 **POLYMER**

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	RATE/UNIT	VALUE (S.R.)
20601	SUBGRADE	M³	169,567.000	12.620	2,139,935.540
3030101	AGGREGATE BASE COURSE	M³	88,848.000	33.690	2,993,289.120
4020102	PRIME COAT (mc1)	M³	434,210.000	0.820	356,052.200
4050101	BIT. BASE COURSE	M³	34,628.000	146.920	5,087,545.760
4050301	BIT. WEARING COURSE	M³	21,533.700	156.470	3,369,378.039
4050802	POLYMER	KGS.	324,870.837	5.000	1,624,354.185
			GRAND TOTAL (S.R.)		15,570,554.844

Suprv'g. Consultant : *ITAL CONSULT*	DOUBLING TAIF AL BAHA-ABHA ROAD	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: __1_ of _1_

Item : *20601* SUBGRADE Drwg. No. _____

20601 SUBGRADE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
20601	SUBGRADE	M³	157,266.200	Page: __1_ of _2_
	Grand total	M³	157,266.200	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

3030101 AGGREGATE BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
3030101	AGGREGATE BASE COURSE	M³	97,777.800	Page: __1_ of _2_
	Grand total	M³	97,777.800	

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: __1_ of _1_
Item : ***4020102*** **PRIME COAT (mc1)** Drwg. No. _____

4020102 PRIME COAT (mc1)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4020102	PRIME COAT (mc1)	M²	424,170.000	Page: __1_ of _2_
	Grand total	M²	424,170.000	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: __1_ of _1_
Item : ***4050101*** **BIT. BASE COURSE** Drwg. No. _____

4050101 BIT. BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050101	BIT. BASE COURSE	M³	33,824.800	Page: __1_ of _2_
	Grand total	M³	33,824.800	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: __1_ of _1_

Item : ***4050301*** **BIT. WEARING COURSE** Drwg. No. _____

4050301 **BIT. WEARING COURSE**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050301	BIT. WEARING COURSE	M^3	20,776.700	Page: __1_ of _2_
	Grand total	M^3	20,776.700	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائيه

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: __1_ of _1_

Item : ***4050802*** **POLYMER** Drwg. No. _____

4050802 **POLYMER**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050802	POLYMER	Kgs.	315,736.203	Page: __1_ of _2_
	Grand total	Kgs.	315,736.203	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

4050802 POLYMER

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M³	157,266.200	
3030101	AGGREGATE BASE COURSE	M³	97,777.800	
4020102	PRIME COAT (mc1)	M²	424,170.000	
4050101	BIT. BASE COURSE	M³	33,824.800	
4050301	BIT. WEARING COURSE	M³	20776.700	
4050802	POLYMER	KGS.	315,736.203	

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: _2__ of __2__

Item : ***20601*** **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

4050802 **POLYMER**

Wt. of Polymer per M³ of BBC in kg/m³
= 2.30x 0.038 x1000 x0.05 = 4.37
Wt. of Polymer per M³ of BWC in kg/m³
= 2.30x 0.047 x1000 x0.05 = 5.41

STATION FROM	STATION TO	DIST. (m.)	WIDTH	SUB-GRADE (0.30 W + 2.3168) x D (Cu. m.)	AGG. BASE COURSE (0.20 W + 1.3367) x D (Cu. m).	PRIME COAT (w + 4.78) x D (Sq.. m).	BIT. BASE COURSE (0.08 W + 0.3792) x D (Cu. m).	BIT. WEARING COURSE (0.05 W + 0.2263) x D (Cu. m).	POLYMER BBC=5.52kgs/m³ & BWC=6.21kgs/m³
Left Side									
10+000.000		7.300							
	10000.000		7.300	45,068.000	27,967.000	120,800.000	9,632.000	5,913.000	89,888.370
20+000.000		7.300							
	1000.000		9.125	5,054.300	3,161.700	13,905.000	1,109.200	682.550	10,361.420
21+000.000		10.950							
	4000.000		9.125	20,217.200	12,646.800	55,620.000	4,436.800	2,730.200	41,445.678
25+000.000		7.300							
	2000.000		6.900	8,773.600	5,433.400	23,360.000	1,862.400	1,142.600	17,375.994
27+000.000		6.500							
Right Side									
10+000.000		6.500							
	10000.000		6.900	43,868.000	27,167.000	116,800.000	9,312.000	5,713.000	86,879.970
20+000.000		7.300							
	1000.000		9.125	5,054.300	3,161.700	13,905.000	1,109.200	682.550	10,361.420
21+000.000		10.950							
	4000.000		9.125	20,217.200	12,646.800	55,620.000	4,436.800	2,730.200	41,445.678
25+000.000		7.300							
	2000.000		7.300	9,013.600	5,593.400	24,160.000	1,926.400	1,182.600	17,977.674
27+000.000		7.300							
SUB - TOTAL				157,266.200	97,777.800	424,170.000	33,824.800	20,776.700	315,736.203

Suprv'g. Consultant :		Contractor :
ITAL CONSULT	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : OUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN

Page: __1_ of _1_

Item : 20601 SUBGRADE

Drwg. No. _____

3030101 AGGREGATE BASE COURSE
4020102 PRIME COAT (mc1)
4050101 BIT. BASE COURSE
4050301 BIT. WEARING COURSE
4050802 POLYMER

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	RATE/UNIT	VALUE (S.R.)
20601	SUBGRADE	M³	157,266.200	12.620	1,984,699.444
3030101	AGGREGATE BASE COURSE	M³	97,777.800	33.690	3,294,134.082
4020102	PRIME COAT (mc1)	M³	424,170.000	0.820	347,819.400
4050101	BIT. BASE COURSE	M³	33,824.800	146.920	4,969,539.616
4050301	BIT. WEARING COURSE	M³	20,776.700	156.470	3,250,930.249
4050802	POLYMER	KGS.	315,736.203	5.000	1,578,681.015
			GRAND TOTAL (S.R.)		15,425,803.806

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *M.O.T.*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES

الكميات النهائية

Project : **FURURE PROJECTS** Page: __1_ of _1_

Item : ***20601*** **SUBGRADE** Drwg. No. _____

20601 SUBGRADE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
20601	SUBGRADE	M³	208,286.200	Page: __1_ of _2_
	Grand total	M³	208,286.200	

Suprv'g. Consultant : *M.O.T.*		FURURE PROJECTS	Contractor : *M. A. AL SWAILEM CO.*	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

3030101 AGGREGATE BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
3030101	AGGREGATE BASE COURSE	M³	118,893.800	Page: __1_ of _2_
	Grand total	M³	118,893.800	

Suprv'g. Consultant : *M.O.T.*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : **FURURE PROJECTS** Page: __1_ of _1_
Item : ***4020102*** **PRIME COAT (mc1)** Drwg. No. _____

4020102 **PRIME COAT (mc1)**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4020102	PRIME COAT (mc1)	M²	436,590.000	Page: __1_ of _2_
	Grand total	M²	436,590.000	

Suprv'g. Consultant : *M.O.T.*		FURURE PROJECTS	Contractor : *M. A. AL SWAILEM CO.*	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : *M.O.T.*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : FURURE PROJECTS
Item : *4050101* BIT. BASE COURSE

Page: __1_ of _1_
Drwg. No. _____

4050101 BIT. BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050101	BIT. BASE COURSE	M³	34,709.600	Page: __1_ of _2_
	Grand total	M³	34,709.600	

Suprv'g. Consultant : *M.O.T.*	FURURE PROJECTS	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : FURURE PROJECTS — Page: __1_ of _1_

Item : *4050301* BIT. WEARING COURSE — Drwg. No. _____

4050301 BIT. WEARING COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050301	BIT. WEARING COURSE	M^3	21,472.500	Page: __1_ of _2_
	Grand total	M^3	21,472.500	

Suprv'g. Consultant : M.O.T.	FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
M.O.T.	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائيه

Project : **FURURE PROJECTS** Page: __1_ of _1_

Item : ***4050802*** **POLYMER** Drwg. No. _____

4050802 **POLYMER**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050802	POLYMER	Kgs.	324,941.217	Page: __1_ of _2_
	Grand total	Kgs.	324,941.217	

Suprv'g. Consultant :		FURURE PROJECTS	Contractor :	
M.O.T.			***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : FURURE PROJECTS

Page: __1_ of _2_

Item : 20601 SUBGRADE

Drwg. No. _____

3030101 AGGREGATE BASE COURSE
4020102 PRIME COAT (mc1)
4050101 BIT. BASE COURSE
4050301 BIT. WEARING COURSE
4050802 POLYMER

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M³	208,286.200	
3030101	AGGREGATE BASE COURSE	M³	118,893.800	
4020102	PRIME COAT (mc1)	M²	436,590.000	
4050101	BIT. BASE COURSE	M³	34,709.600	
4050301	BIT. WEARING COURSE	M³	21472.500	
4050802	POLYMER	KGS.	324,941.217	

Suprv'g. Consultant : M.O.T.		FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : FURURE PROJECTS — Page: _2__ of __2__

Item : Drwg. No. _____

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE
4050802	POLYMER

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUB-GRADE (0.30 W +3.7018) x D (Cu. m.)	AGG. BASE COURSE (0.20 W +1.8807) x D (Cu. m).	PRIME COAT (W + 4.76) x D (Sq.. m).	BIT. BASE COURSE (0.08 W +0.3744) x D (Cu. m).	BIT. WEARING COURSE (0.05 W +0.2275) x D (Cu. m).	POLYMER BBC=5.52kgs/m³ & BWC=6.21kgs/m³
Left Side									
10+000.000		7.300							
	10000.000		7.750	60,268.000	34,307.000	125,100.000	9,944.000	6,150.000	93,082.380
20+000.000		8.200							
	1000.000		9.575	6,574.300	3,795.700	14,335.000	1,140.400	706.250	10,680.821
21+000.000		10.950							
	4000.000		9.125	25,757.200	14,822.800	55,540.000	4,417.600	2,735.000	41,369.502
25+000.000		7.300							
	2000.000		6.900	11,543.600	6,521.400	23,320.000	1,852.800	1,145.000	17,337.906
27+000.000		6.500							
Right Side									
10+000.000		7.300							
	10000.000		7.750	60,268.000	34,307.000	125,100.000	9,944.000	6,150.000	93,082.380
20+000.000		8.200							
	1000.000		9.575	6,574.300	3,795.700	14,335.000	1,140.400	706.250	10,680.821
21+000.000		10.950							
	4000.000		9.125	25,757.200	14,822.800	55,540.000	4,417.600	2,735.000	41,369.502
25+000.000		7.300							
	2000.000		6.900	11,543.600	6,521.400	23,320.000	1,852.800	1,145.000	17,337.906
27+000.000		6.500							
SUB-TOTAL				208,286.200	118,893.800	436,590.000	34,709.600	21,472.500	324,941.217

Suprv'g. Consultant : M.O.T.	FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : **FURURE PROJECTS** Page: __1_ of _1_

Item : 20601 **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

4050802 **POLYMER**

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	RATE/UNIT	VALUE (S.R.)
20601	SUBGRADE	M³	208,286.200	12.620	2,628,571.844
3030101	AGGREGATE BASE COURSE	M³	118,893.800	33.690	4,005,532.122
4020102	PRIME COAT (mc1)	M³	436,590.000	0.820	358,003.800
4050101	BIT. BASE COURSE	M³	34,709.600	146.920	5,099,534.432
4050301	BIT. WEARING COURSE	M³	21,472.500	156.470	3,359,802.075
4050802	POLYMER	KGS.	324,941.217	5.000	1,624,706.085
			GRAND TOTAL (S.R.)		17,076,150.358

Suprv'g. Consultant : M.O.T.	FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : **FURURE PROJECTS** Page: __1_ of _1_

Item : ***20601*** **SUBGRADE** Drwg. No. _____

20601 SUBGRADE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
20601	SUBGRADE	M³	204,356.200	Page: __1_ of _2_
	Grand total	M³	204,356.200	

Suprv'g. Consultant : M.O.T.	FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : FURURE PROJECTS — Page: __1_ of _1_
Item : 3030101 AGGREGATE BASE COURSE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
3030101	AGGREGATE BASE COURSE	M³	128,785.800	Page: __1_ of _2_
	Grand total	M³	128,785.800	

Suprv'g. Consultant : M.O.T.	FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : *M.O.T.*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : **FURURE PROJECTS** Page: __1_ of _1_
Item : ***4020102*** **PRIME COAT (mc1)** Drwg. No. _____

4020102 PRIME COAT (mc1)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4020102	PRIME COAT (mc1)	M²	423,490.000	Page: __1_ of _2_
	Grand total	M²	423,490.000	

Suprv'g. Consultant : *M.O.T.*		FURURE PROJECTS	Contractor : *M. A. AL SWAILEM CO.*	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

4050101 BIT. BASE COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050101	BIT. BASE COURSE	M³	21,149.600	Page: __1_ of _2_
	Grand total	M³	21,149.600	

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : FURURE PROJECTS — Page: __1_ of _1_

Item : *4050301* BIT. WEARING COURSE — Drwg. No. _____

4050301 BIT. WEARING COURSE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050301	BIT. WEARING COURSE	M³	20,817.500	Page: __1_ of _2_
	Grand total	M³	20,817.500	

Suprv'g. Consultant : M.O.T.	FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
M.O.T.	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائيه

Project : **FURURE PROJECTS** Page: __1_ of _1_

Item : ***4050802*** **POLYMER** Drwg. No. _____

4050802 **POLYMER**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
4050802	POLYMER	Kgs.	246,022.467	Page: __1_ of _2_
	Grand total	Kgs.	246,022.467	

Suprv'g. Consultant :		FURURE PROJECTS	Contractor :	
M.O.T.			***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : FURURE PROJECTS

Page: __1_ of _2_

Item : 20601 SUBGRADE

Drwg. No. _____

3030101 AGGREGATE BASE COURSE
4020102 PRIME COAT (mc1)
4050101 BIT. BASE COURSE
4050301 BIT. WEARING COURSE
4050802 POLYMER

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M³	204,356.200	
3030101	AGGREGATE BASE COURSE	M³	128,785.800	
4020102	PRIME COAT (mc1)	M²	423,490.000	
4050101	BIT. BASE COURSE	M³	21,149.600	
4050301	BIT. WEARING COURSE	M³	20817.500	
4050802	POLYMER	KGS.	246,022.467	

Suprv'g. Consultant : M.O.T.	FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *M.O.T.*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : FURURE PROJECTS — Page: _2__ of __2__

Item : Drwg. No. _____

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE
4050802	POLYMER

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUB-GRADE (0.30 W +3.7018) x D (Cu. m.)	AGG. BASE COURSE (0.20 W +2.2487) x D (Cu. m).	PRIME COAT (W + 4.76) x D (Sq.. m).	BIT. BASE COURSE (0.08 W +0.0064) x D (Cu. m).	BIT. WEARING COURSE (0.05 W +0.2275) x D (Cu. m).	POLYMER BBC=5.52kgs/m³ & BWC=6.21kgs/m³
Left Side									
10+000.000		7.300							
	10000.000		7.300	58,918.000	37,087.000	120,600.000	5,904.000	5,925.000	69,384.330
20+000.000		7.300							
	1000.000		9.125	6,439.300	4,073.700	13,885.000	736.400	683.750	8,311.016
21+000.000		10.950							
	4000.000		9.125	25,757.200	16,294.800	55,540.000	2,945.600	2,735.000	33,244.062
25+000.000		7.300							
	2000.000		6.900	11,543.600	7,257.400	23,320.000	1,116.800	1,145.000	13,275.186
27+000.000		6.500							
Right Side									
10+000.000		6.500							
	10000.000		6.900	57,718.000	36,287.000	116,600.000	5,584.000	5,725.000	66,375.930
20+000.000		7.300							
	1000.000		9.125	6,439.300	4,073.700	13,885.000	736.400	683.750	8,311.016
21+000.000		10.950							
	4000.000		9.125	25,757.200	16,294.800	55,540.000	2,945.600	2,735.000	33,244.062
25+000.000		7.300							
	2000.000		7.300	11,783.600	7,417.400	24,120.000	1,180.800	1,185.000	13,876.866
27+000.000		7.300							
SUB-TOTAL				204,356.200	128,785.800	423,490.000	21,149.600	20,817.500	246,022.467

Suprv'g. Consultant : *M.O.T.*	*FURURE PROJECTS*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : M.O.T.	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : FURURE PROJECTS

Page: __1_ of _1_

Item : 20601 SUBGRADE

Drwg. No. _____

3030101 AGGREGATE BASE COURSE
4020102 PRIME COAT (mc1)
4050101 BIT. BASE COURSE
4050301 BIT. WEARING COURSE
4050802 POLYMER

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	RATE/UNIT	VALUE (S.R.)
20601	SUBGRADE	M³	204,356.200	12.620	2,578,975.244
3030101	AGGREGATE BASE COURSE	M³	128,785.800	33.690	4,338,793.602
4020102	PRIME COAT (mc1)	M³	423,490.000	0.820	347,261.800
4050101	BIT. BASE COURSE	M³	21,149.600	146.920	3,107,299.232
4050301	BIT. WEARING COURSE	M³	20,817.500	156.470	3,257,314.225
4050802	POLYMER	KGS.	246,022.467	5.000	1,230,112.335
			GRAND TOTAL (S.R.)		14,859,756.438

Suprv'g. Consultant : M.O.T.	FURURE PROJECTS	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

COPUTATION OF QUANTITIES

Project : **HARAMAIN HIGHSPEED RAILWAY**
HAJJ INTERCHANGE

Page: __1_ of _1_
Drwg. No. _____

SUMMARY

		ITEM NO. & DESCRIPTION				
		20601	3030101	4020102	4050101	4050301
LOCATION	DISTANCE (m)	SUBGRADE (m3)	AGGREGATE BASE COURSE (m3)	BITUMINOUS PRIME COAT (m2)	BITUMINOUS BASE COURSE (m3)	BITUMINOUS WEARING COURSE (m3)
CROSS ROAD	From:Sta.0+000 1,650.000 To:Sta.1+650	16,994.460	11,157.745	36,082.152	6,796.729	2,067.204
RAMP 1	1,818.001	11,476.190	5,862.625	18,930.264	3,639.216	1,123.317
RAMP 2	591.939	3,538.892	1,603.807	5,144.802	980.668	240.155
RAMP 3	878.530	6,996.348	3,314.290	10,665.431	2,041.358	500.796
RAMP 4	831.340	6,466.631	3,134.756	10,088.926	1,931.323	473.835
RAMP 5	536.550	4,124.286	2,033.959	6,563.066	1,260.582	309.736
RAMP 6	392.240	2,776.962	1,214.296	3,874.946	733.540	179.072
RAMP 7	345.799	2,537.655	1,167.864	3,747.132	714.447	174.973
LOOP 1	613.543	4,421.473	1,910.690	6,099.511	1,155.233	282.079
LOOP 2	483.450	3,769.704	1,698.269	5,451.878	1,040.212	254.834
LOOP 3	395.993	2,864.289	1,209.111	3,857.565	730.040	178.195
LOOP 4	391.988	2,861.236	1,145.876	3,649.833	689.226	168.068
SR-1	342.250	2,867.546	1,284.916	4,114.600	782.491	191.412
SR-2	105.680	685.942	375.612	1,203.643	229.113	56.069
SR-3	141.580	1,139.256	501.721	1,604.661	304.674	74.476
SR-4	131.590	814.474	302.054	952.831	177.602	43.051
GRAND TOTAL =	**9,650.473**	**74,335.344**	**37,917.591**	**122,031.241**	**23,206.454**	**6,317.272**

Suprv'g. Consultant : DAR AL HANDASAH		HARAMAIN HIGHSPEED RAILWAY HAJJ INTERCHANGE	Contractor : AL RAHJI ALLIANCE	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD LEFT/RIGHT SIDES

Page: _1__ of _5_

Item :

20601 SUBGRADE
3030101 AGGREGATE BASE COURSE
4020102 PRIME COAT (mc1)
4050101 BIT. BASE COURSE
4050301 BIT. WEARING COURSE

Drwg. No. _____

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	LEFT	RIGHT	TOTAL
20601	SUBGRADE	M³	8,752.744	8,241.716	16,994.460
3030101	AGGREGATE BASE COURSE	M³	5,695.299	5,462.446	11,157.745
4020102	PRIME COAT (mc1)	M²	18,814.615	17,267.537	36,082.152
4050101	BIT. BASE COURSE	M³	3,481.604	3,315.125	6,796.729
4050301	BIT. WEARING COURSE	M³	1,100.801	966.403	2,067.204

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD LEFT/RIGHT SIDES	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD LEFT SIDE — Page: _2__ of __3__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.455) x D	(W + 4.15) x D	(0.20 W +0.7300) x D	(0.05 W +0.1763) x D	
							VAR x D	+0.495) x D	1.20) x D	+0.2000) x D	+0.0500) x D	Vertical left
							VAR x D	+0.960) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
CROSS ROAD LEFT SIDE												
0+000.000		7.300		1.50%	0.000	5.604						
	122.012		7.300				743.129	444.734	1,397.037	267.206	66.045	
0+122.012		7.300		1.50%	0.000	5.604						
	89.926		9.125				596.940	377.015	1,193.768	229.761	56.883	
0+211.938		10.950		1.50%	0.000	5.604						
	39.604		10.950				284.579	187.723	598.020	115.644	28.665	
0+251.542		10.950		1.50%	0.000	5.604						
	0.000		9.125				0.000	0.000	0.000	0.000	0.000	
0+251.542		7.300		1.50%	0.000	5.604						
	74.161		7.300				205.797	199.122	849.143	123.107	30.777	vertical left
0+325.703		7.300		1.50%	0.000	5.604						
	232.705		7.300				1,417.318	848.210	2,664.472	509.624	125.963	
0+558.408		7.300		1.50%	0.000	5.604						
	55.411		7.300				153.766	148.779	634.456	91.982	22.996	vertical left
0+613.819		7.300		1.50%	0.000	5.604						
	0.000		9.125				0.000	0.000	0.000	0.000	0.000	
0+613.819		10.950		1.50%	0.000	5.604						
	127.761		10.950				918.042	605.587	1,929.191	373.062	92.473	
0+741.580		10.950		1.50%	0.000	5.604						
	217.050		10.950								237.670	Bridge
0+958.630		10.950		1.50%	0.000	5.604						
	29.514		10.950				212.076	139.896	445.661	86.181	21.362	
0+988.144		10.950		1.50%	0.000	5.604						
	0.000		9.125				0.000	0.000	0.000	0.000	0.000	
0+988.144		7.300		1.50%	0.000	5.604						
	24.945		7.300				69.222	66.977	285.620	41.409	10.352	vertical left
1+013.089		7.300		1.50%	0.000	5.604						
	201.192		7.300				1,225.384	733.345	2,303.648	440.610	108.905	
1+214.281		7.300		1.50%	0.000	5.604						
	50.370		7.300				308.409	183.599	576.737	110.310	27.265	
1+264.651		7.300		1.90%	0.000	5.756						
SUB-TOTAL							6,134.662	3,934.986	12,877.755	2,388.897	829.357	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD LEFT SIDE	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD LEFT SIDE — Page: _2__ of __3__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.305) x D	(W + 3.65) x D	(0.20 W +0.6300) x D	(0.05 W +0.1513) x D	
							VAR x D	+0.345) x D	0.70) x D	+0.1000) x D	+0.0250) x D	Vertical left
							VAR x D	+0.960) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
CROSS ROAD LEFT SIDE												
1+264.651		7.300		1.90%	0.000	5.756						
	44.199		7.300				280.182	154.476	483.979	92.376	22.820	
1+308.850		7.300		5.07%	0.000	7.328						
	6.171		7.300				16.199	15.643	67.572	9.627	2.407	vertical left
1+315.021		7.300		5.30%	0.000	7.478						
	99.734		7.300				261.802	252.826	1,092.087	155.585	38.896	vertical left
1+414.755		7.300		5.30%	0.000	7.478						
	0.000		10.950				0.000	0.000	0.000	0.000	0.000	
1+414.755		14.600		5.30%	0.000	7.478						
	134.505		14.600				1,200.713	764.661	2,454.716	477.493	118.539	
1+549.260		14.600		5.30%	0.000	7.478						
	100.740		14.600				859.187	572.707	1,838.505	357.627	88.782	
1+650.000		14.600		1.50%	0.000	5.604						
SUB-TOTAL							2,618.082	1,760.313	5,936.860	1,092.707	271.444	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD LEFT SIDE	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD RIGHT SIDE

Page: _3__ of __3__

Drwg. No. _____

Item :

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.455) x D	(W + 4.15) x D	(0.20 W +0.7300) x D	(0.05 W +0.1763) x D	
							VAR x D	+0.495) x D	1.20) x D	+0.2000) x D	+0.0500) x D	Vertical right
							VAR x D	+0.960) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
CROSS ROAD RIGHT SIDE												
0+000.000		7.300		1.50%	0.000	5.604						
	360.000		7.300				2,192.623	1,312.200	4,122.000	788.400	194.868	
0+360.000		7.300		1.50%	0.000	5.604						
	67.917		8.697				442.121	276.021	872.530	167.714	41.507	
0+427.917		10.094		1.50%	0.000	5.604						
	129.378		12.344				983.767	667.358	2,133.961	413.854	102.661	
0+557.295		14.594		1.50%	0.000	5.604						
	0.000		10.944				0.000	0.000	0.000	0.000	0.000	
0+557.295		7.294		1.50%	0.000	5.604						
	94.354		7.297				232.814	297.130	966.845	187.708	46.342	vertical right
0+651.649		7.300		1.50%	0.000	5.604						
	106.803		7.300				650.496	389.297	1,222.894	233.899	57.812	
0+758.452		7.300		1.50%	0.000	5.604						
	200.178		7.324								146.610	BRIDGE
0+958.630		7.348		1.50%	0.000	5.604						
	167.977		9.149				1,116.261	705.453	2,233.926	429.988	106.455	
1+126.607		10.950		1.50%	0.000	5.604						
	0.000		9.125				0.000	0.000	0.000	0.000	0.000	
1+126.607		7.300		1.50%	0.000	5.604						
	70.663		7.300				174.421	222.588	724.296	140.619	34.717	vertical right
1+197.270		7.300		1.50%	0.000	5.604						
	17.011		7.300				103.608	62.005	194.776	37.254	9.208	
1+214.281		7.300		1.50%	0.000	5.604						
	50.370		7.300				295.799	183.599	576.737	110.310	27.265	
1+264.651		7.300		-1.90%	0.000	4.578						
SUB-TOTAL							6,191.910	4,115.651	13,047.965	2,509.746	767.447	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD RIGHT SIDE	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD RIGHT SIDE

Page: _3__ of __3__

Drwg. No. _____

Item :

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.305) x D	(W + 3.65) x D	(0.20 W +0.6300) x D	(0.05 W +0.1513) x D	
							VAR x D	+0.345) x D	0.70) x D	+0.1000) x D	+0.0250) x D	Vertical right
							VAR x D	+0.960) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
CROSS ROAD RIGHT SIDE												
1+264.651		7.300		-1.90%	0.000	4.578						
	50.370		7.300				269.674	176.043	551.551	105.273	26.006	
1+315.021		7.300		-5.30%	0.000	3.870						
	234.239		7.300				1,218.813	818.665	2,564.917	489.560	120.938	
1+549.260		7.300		-5.30%	0.000	3.870						
	100.740		7.300				561.319	352.086	1,103.103	210.547	52.012	
1+650.000		7.300		1.50%	0.000	5.604						
SUB-TOTAL							2,049.806	1,346.795	4,219.572	805.379	198.956	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - CROSS ROAD RIGHT SIDE	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- LOOP 1 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	4,421.473	
3030101	AGGREGATE BASE COURSE	M^3	1,910.690	
4020102	PRIME COAT (mc1)	M^2	6,099.511	
4050101	BIT. BASE COURSE	M^3	1,155.233	
4050301	BIT. WEARING COURSE	M^3	282.079	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- LOOP 1	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *DAR AL HANDASAH*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *AL RAHJI ALLIANCE*

PAVEMENT COMPUTATION

Project : **HHR - AIR DEFENSE INTERCHANGE- LOOP 1** Page: _2__ of __2__

Item : *20601* SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079
Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq. m).	(Cu. m).	(Cu. m).	
LOOP 1												
0+000.000		5.000		-1.50%	5.604	4.679						
	50.000		6.316				244.209	142.740	463.300	89.660	22.105	Vertical left
0+050.000		7.632		-1.50%	5.604	4.679						
	52.225		9.286				301.609	195.624	639.025	124.672	30.844	Vertical left
0+102.225		10.940		-1.50%	5.604	4.679						
	0.000		7.970				0.000	0.000	0.000	0.000	0.000	
0+102.225		5.000		-1.50%	5.604	4.679						
	32.775		5.000				243.318	102.258	324.473	60.962	14.831	
0+135.000		5.000		-1.50%	5.604	4.679						
	21.983		5.000				162.811	68.587	217.632	40.888	9.947	
0+156.983		5.000		0.00%	5.100	5.100						
	50.360		5.000				385.424	157.123	498.564	93.670	22.788	
0+207.343		5.000		5.50%	3.835	7.612						
	90.864		5.000				719.485	283.496	899.554	169.007	41.116	
0+298.207		5.000		5.50%	3.835	7.612						
	50.950		5.000				395.345	158.964	504.405	94.767	23.055	
0+349.157		5.000		3.60%	4.194	6.505						
	35.068		5.000				266.540	109.412	347.173	65.226	15.868	
0+384.225		5.000		3.60%	4.194	6.505						
	50.390		5.000				392.702	157.217	498.861	93.725	22.801	
0+434.615		5.000		5.80%	3.783	7.822						
	128.928		5.000				1,029.598	402.255	1,276.387	239.806	58.340	
0+563.543		5.000		5.80%	3.783	7.822						
	2.957		5.000				23.531	9.226	29.274	5.500	1.338	
0+566.500		5.000		5.55%	3.825	7.648						
	0.000		7.511				0.000	0.000	0.000	0.000	0.000	
0+566.500		10.022		5.55%	3.825	7.648						
	18.401		7.511				116.062	59.128	192.493	37.395	9.235	Vertical left
0+584.901		5.000		4.02%	4.110	6.720						
	28.642		4.325				140.839	64.659	208.371	39.956	9.811	Vertical left
0+613.543		3.650		1.50%	4.679	5.604						
SUB-TOTAL							4,421.473	1,910.690	6,099.511	1,155.233	282.079	

Suprv'g. Consultant : *DAR AL HANDASAH*	*HHR - AIR DEFENSE INTERCHANGE- LOOP 1*	Contractor : *AL RAHJI ALLIANCE*
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - LOOP 2 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	3,769.704	
3030101	AGGREGATE BASE COURSE	M^3	1,698.269	
4020102	PRIME COAT (mc1)	M^2	5,451.878	
4050101	BIT. BASE COURSE	M^3	1,040.212	
4050301	BIT. WEARING COURSE	M^3	254.834	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - LOOP 2	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - LOOP 2 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
LOOP 2												
0+000.000		3.650		1.50%	4.679	5.604						
	31.586		4.325				154.554	71.305	229.788	44.062	10.820	Vertical left
0+031.586		5.000		3.80%	4.153	6.606						
	18.414		5.000				103.082	45.298	146.391	28.173	6.929	Vertical left
0+050.000		5.000		6.00%	3.750	7.969						
	4.029		7.932				27.265	13.455	43.844	8.527	2.107	Vertical left
0+054.029		10.864		6.00%	3.750	7.969						
	0.000		7.932				0.000	0.000	0.000	0.000	0.000	
0+054.029		5.000		6.00%	3.750	7.969						
	40.555		5.000				325.818	126.532	401.495	75.432	18.351	
0+094.584		5.000		6.00%	3.750	7.969						
	30.382		5.000				240.514	94.792	300.782	56.511	13.748	
0+124.966		5.000		4.90%	3.941	7.224						
	112.841		5.000				880.009	352.064	1,117.126	209.884	51.061	
0+237.807		5.000		4.90%	3.941	7.224						
	19.574		5.000				154.954	61.071	193.783	36.408	8.857	
0+257.381		5.000		6.00%	3.750	7.969						
	10.808		5.000				63.633	26.588	85.924	16.536	4.067	Vertical left
0+268.189		5.000		6.00%	3.750	7.969						
	9.065		5.000				53.371	22.300	72.067	13.869	3.411	Vertical left
0+277.254		5.000		6.00%	3.750	7.969						
	0.000		7.437				0.000	0.000	0.000	0.000	0.000	
0+277.254		9.874		6.00%	3.750	7.969						
	136.196		9.437				1,275.488	606.222	1,952.642	374.185	91.844	
0+413.450		9.000		6.00%	3.750	7.969						
	13.069		8.967				118.988	56.329	181.228	34.677	8.506	
0+426.519		8.934		4.88%	3.945	7.211						
	0.000		11.433				0.000	0.000	0.000	0.000	0.000	
0+426.519		13.932		4.88%	3.945	7.211						
	42.192		10.675				291.480	175.624	574.866	112.442	27.849	Vertical left
0+468.711		7.418		1.26%	4.741	5.518						
	14.739		7.359				80.548	46.689	151.944	29.505	7.285	Vertical left
0+483.450		7.300		0.00%	5.100	5.100						
SUB-TOTAL							3,769.704	1,698.269	5,451.878	1,040.212	254.834	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - LOOP 2	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer	LOOP 2	Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - LOOP 3 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	2,864.289	
3030101	AGGREGATE BASE COURSE	M^3	1,209.111	
4020102	PRIME COAT (mc1)	M^2	3,857.565	
4050101	BIT. BASE COURSE	M^3	730.040	
4050301	BIT. WEARING COURSE	M^3	178.195	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - LOOP 3	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor :
DAR AL HANDASAH		***AL RAHJI ALLIANCE***

PAVEMENT COMPUTATION

Project : **HHR - AIR DEFENSE INTERCHANGE - LOOP 3** Page: _2__ of __2__

Item : ***20601*** **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079
Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
LOOP 3												
0+000.000		3.650		1.50%	4.679	5.604						
	32.888		4.325				159.873	74.245	239.260	45.879	11.266	Vertical left
0+032.888		5.000		3.50%	4.215	6.456						
	17.112		5.944				96.730	46.942	152.194	29.412	7.247	Vertical left
0+050.000		6.888		4.60%	3.997	7.044						
	18.536		8.872				123.377	67.127	219.123	42.713	10.563	Vertical left
0+068.536		10.855		4.60%	3.997	7.044						
	0.000		7.928				0.000	0.000	0.000	0.000	0.000	
0+068.536		5.000		4.60%	3.997	7.044						
	295.224		5.000				2,286.796	921.099	2,922.718	549.117	133.589	
0+363.760		5.000		4.60%	3.997	7.044						
	0.000		7.470				0.000	0.000	0.000	0.000	0.000	
0+363.760		9.939		4.60%	3.997	7.044						
	11.240		8.777				74.494	40.385	131.806	25.687	6.352	Vertical left
0+375.000		7.614		4.60%	3.997	7.044						
	20.993		6.218				123.020	59.314	192.464	37.233	9.178	Vertical left
0+395.993		4.822		4.60%	3.997	7.044						
SUB-TOTAL							2,864.289	1,209.111	3,857.565	730.040	178.195	

Suprv'g. Consultant :		Contractor :
DAR AL HANDASAH	***HHR - AIR DEFENSE INTERCHANGE - LOOP 3***	***AL RAHJI ALLIANCE***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - LOOP 4 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	2,861.236	
3030101	AGGREGATE BASE COURSE	M^3	1,145.876	
4020102	PRIME COAT (mc1)	M^2	3,649.833	
4050101	BIT. BASE COURSE	M^3	689.226	
4050301	BIT. WEARING COURSE	M^3	168.068	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - LOOP 4	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - LOOP 4 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
LOOP 4												
0+000.000		3.650		1.50%	4.679	5.604						
	30.178		4.325				149.080	68.127	219.545	42.098	10.337	Vertical left
0+030.178		5.000		4.22%	4.070	6.827						
	19.822		5.000				111.894	48.762	157.585	30.328	7.459	Vertical left
0+050.000		5.000		6.00%	3.750	7.969						
	2.581		7.933				17.467	8.620	28.088	5.463	1.350	Vertical left
0+052.581		10.865		6.00%	3.750	7.969						
	0.000		7.933				0.000	0.000	0.000	0.000	0.000	
0+052.581		5.000		6.00%	3.750	7.969						
	66.261		5.000				532.340	206.734	655.984	123.245	29.983	
0+118.842		5.000		6.00%	3.750	7.969						
	55.815		5.000				448.417	174.143	552.569	103.816	25.256	
0+174.657		5.000		6.00%	3.750	7.969						
	164.947		5.000				1,325.183	514.635	1,632.975	306.801	74.639	
0+339.604		5.000		6.00%	3.750	7.969						
	0.000		7.502				0.000	0.000	0.000	0.000	0.000	
0+339.604		10.003		6.00%	3.750	7.969						
	1.978		7.502				13.130	6.350	20.673	4.016	0.992	Vertical left
0+341.582		5.000		6.00%	3.750	7.969						
	23.275		5.000				130.606	57.257	185.036	35.611	8.758	Vertical left
0+364.857		5.000		3.92%	4.129	6.669						
	27.131		4.325				133.119	61.248	197.378	37.848	9.294	Vertical left
0+391.988		3.650		1.50%	4.679	5.604						
SUB-TOTAL							2,861.236	1,145.876	3,649.833	689.226	168.068	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - LOOP 4	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - RAMP 1 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	11,476.190	
3030101	AGGREGATE BASE COURSE	M^3	5,862.625	
4020102	PRIME COAT (mc1)	M^2	18,930.264	
4050101	BIT. BASE COURSE	M^3	3,639.216	
4050301	BIT. WEARING COURSE	M^3	1123.317	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - RAMP 1	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - RAMP 1

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Drwg. No. _____

Item :

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
RAMP 1												
0+000.000		11.132		1.50%	4.679	5.604						
	5.982		11.213				55.627	29.814	96.388	18.560	4.565	
0+005.982		11.294		1.91%	4.575	5.761						
	0.000		9.297				0.000	0.000	0.000	0.000	0.000	
0+005.982		7.300		1.91%	4.575	5.761						
	59.177		8.643				153.440	153.440	511.467	102.293	25.573	Vertical B/S
0+065.159		9.986		6.00%	3.750	7.969						
	29.280		12.821				112.615	112.615	375.384	75.077	18.769	Vertical B/S
0+094.439		15.655		6.00%	3.750	7.969						
	0.000		11.949				0.000	0.000	0.000	0.000	0.000	Vertical B/S
0+094.439		8.242		6.00%	3.750	7.969						
	14.698		7.771				66.889	43.966	142.879	27.694	6.832	vertical right
0+109.137		7.300		6.00%	3.750	7.969						
	96.289		7.300				424.596	274.424	890.673	172.357	42.492	Vertical right
0+205.426		7.300		6.00%	3.750	7.969						
	69.065		7.300				315.137	196.835	638.851	123.626	30.478	Vertical right
0+274.491		7.300		2.34%	4.471	5.934						
	44.257		7.300				214.636	126.132	409.377	79.220	19.531	Vertical right
0+318.748		7.300		0.00%	5.100	5.100						
	80.944		7.300				673.644	308.397	987.517	187.790	45.936	
0+399.692		7.300		-5.30%	7.478	3.870						
	40.745		7.300				349.029	155.238	497.089	94.528	23.123	
0+440.437		7.300		-5.30%	7.478	3.870						
	70.556		7.300								51.506	BRIDGE
0+510.993		7.300		-5.30%	7.478	3.870						
	19.894		7.539								14.998	BRIDGE
0+530.887		7.778		-5.30%	7.478	3.870						
	160.786		7.539				1,388.851	624.123	2,000.017	380.709	93.167	
0+691.673		7.300		-5.30%	7.478	3.870						
	0.000		9.125				0.000	0.000	0.000	0.000	0.000	
0+691.673		10.950		-5.30%	7.478	3.870						
	39.244		9.125				256.715	133.331	434.627	84.571	20.899	Vertical right
0+730.917		7.300		-5.30%	7.478	3.870						
	43.077		7.300				258.204	122.769	398.462	77.108	19.010	Vertical right
0+773.994		7.300		-5.30%	7.478	3.870						
	55.908		7.300				478.918	213.009	682.078	129.707	31.728	
0+829.902		7.300		-5.30%	7.478	3.870						
	46.800		7.300								34.164	BRIDGE
0+876.702		7.300		-5.30%	7.478	3.870						
	115.932		7.300				993.095	441.701	1,414.370	268.962	65.791	
0+992.634		7.300		-5.30%	7.478	3.870						
SUB-TOTAL							5,741.397	2,935.796	9,479.180	1,822.203	548.564	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - RAMP 1	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer	RAMP 1	Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - RAMP 1

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Drwg. No. _____

Item :

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079
Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
RAMP 1												
0+992.634		7.300		-5.30%	7.478	3.870						
	11.532		7.300				69.123	32.866	106.671	20.642	5.089	Vertical right
1+004.166		7.300		-5.30%	7.478	3.870						
	13.956		7.300				81.942	39.775	129.093	24.981	6.159	Vertical right
1+018.122		7.300		-4.35%	6.901	4.044						
	34.029		7.300				187.729	96.983	314.768	60.912	15.017	Vertical right
1+052.151		7.300		-2.03%	5.809	4.545						
	0.000		9.127				0.000	0.000	0.000	0.000	0.000	
1+052.151		10.954		-2.03%	5.809	4.545						
	7.839		10.952				72.311	38.455	124.264	23.912	5.880	
1+059.990		10.950		-1.50%	5.604	4.679						
	4.267		10.950				39.294	20.930	67.632	13.014	3.200	
1+064.257		10.950		-1.50%	5.604	4.679						
	117.000		10.950								128.115	BRIDGE
1+181.257		10.950		-1.50%	5.604	4.679						
	85.443		10.950				786.836	419.098	1,354.272	260.601	64.082	
1+266.700		10.950		-1.50%	5.604	4.679						
	0.000		9.125				0.000	0.000	0.000	0.000	0.000	
1+266.700		7.300		-1.50%	5.604	4.679						
	32.068		7.300				166.680	91.394	296.629	57.402	14.152	Vertical right
1+298.768		7.300		-1.50%	5.604	4.679						
	25.015		7.300				130.021	71.293	231.389	44.777	11.039	Vertical right
1+323.783		7.300		-1.50%	5.604	4.679						
	68.957		7.300				559.510	262.726	841.275	159.980	39.133	
1+392.740		7.300		-1.50%	5.604	4.679						
	85.000		7.300				701.316	323.850	1,037.000	197.200	48.238	
1+477.740		7.300		-4.30%	6.873	4.054						
	94.350		7.300				791.374	359.474	1,151.070	218.892	53.544	
1+572.090		7.300		-4.30%	6.873	4.054						
	0.000		9.627				0.000	0.000	0.000	0.000	0.000	
1+572.090		11.954		-4.30%	6.873	4.054						
	65.141		9.627				419.189	231.127	754.137	146.919	36.326	Vertical right
1+637.231		7.300		-4.30%	6.873	4.054						
	14.941		7.300				85.717	42.582	138.204	26.744	6.593	Vertical right
1+652.172		7.300		-4.30%	6.873	4.054						
	0.000		10.726				0.000	0.000	0.000	0.000	0.000	
1+652.172		14.151		-4.30%	6.873	4.054						
	80.828		13.437				826.757	456.755	1,482.103	286.721	70.670	
1+733.000		12.722		-4.30%	6.873	4.054						
	85.001		11.836				816.993	439.523	1,422.577	274.315	67.516	
1+818.001		10.950		-1.50%	5.604	4.679						
SUB-TOTAL							5,734.794	2,926.829	9,451.084	1,817.014	574.753	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - RAMP 1	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer	RAMP 1	Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - RAMP 2 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	3,538.892	
3030101	AGGREGATE BASE COURSE	M^3	1,603.807	
4020102	PRIME COAT (mc1)	M^2	5,144.802	
4050101	BIT. BASE COURSE	M^3	980.668	
4050301	BIT. WEARING COURSE	M^3	240.155	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - RAMP 2	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - RAMP 2 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
RAMP 2												
0+000.000		3.994		1.50%	4.679	5.604						
	57.407		4.158				266.632	126.720	408.049	78.165	19.185	Vertical left
0+057.407		4.322		1.68%	4.632	5.673						
	207.143		4.661				1,007.817	488.505	1,576.565	302.884	74.437	Vertical left
0+264.550		5.000		2.34%	4.472	5.933						
	25.877		6.379				140.665	74.359	241.394	46.726	11.521	Vertical left
0+290.427		7.757		2.34%	4.472	5.933						
	16.348		9.311				103.249	61.359	200.443	39.108	9.676	Vertical left
0+306.775		10.865		2.34%	4.472	5.933						
	0.000		7.933				0.000	0.000	0.000	0.000	0.000	
0+306.775		5.000		2.34%	4.472	5.933						
	70.326		5.000				525.734	219.417	696.227	130.806	31.823	
0+377.101		5.000		2.34%	4.472	5.933						
	142.615		5.000				1,094.702	444.959	1,411.889	265.264	64.533	
0+519.716		5.000		5.30%	3.870	7.478						
	0.000		7.483				0.000	0.000	0.000	0.000	0.000	
0+519.716		9.965		5.30%	3.870	7.478						
	21.771		7.867				142.363	72.282	235.497	45.793	11.313	Vertical left
0+541.487		5.769		5.30%	3.870	7.478						
	7.275		5.385				41.622	18.736	60.633	11.690	2.877	Vertical left
0+548.762		5.000		4.75%	3.969	7.134						
	43.176		4.325				216.108	97.470	314.105	60.231	14.790	Vertical left
0+591.938		3.650		1.50%	4.679	5.604						
SUB-TOTAL							3,538.892	1,603.807	5,144.802	980.668	240.155	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - RAMP 2	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - RAMP 3 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	6,996.348	
3030101	AGGREGATE BASE COURSE	M^3	3,314.290	
4020102	PRIME COAT (mc1)	M^2	10,665.431	
4050101	BIT. BASE COURSE	M^3	2,041.358	
4050301	BIT. WEARING COURSE	M^3	500.796	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - RAMP 3	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE - RAMP 3 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079
Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
RAMP 3												
0+000.000		7.300		5.30%	3.870	7.478						
	63.159		8.096				423.920	214.024	697.623	135.735	33.542	Vertical left
0+063.159		8.891		6.00%	3.750	7.969						
	35.219		11.038				271.151	150.434	492.643	96.416	23.886	Vertical left
0+098.378		13.185		6.00%	3.750	7.969						
	0.000		10.243				0.000	0.000	0.000	0.000	0.000	
0+098.378		7.300		6.00%	3.750	7.969						
	74.891		7.300				653.348	285.335	913.670	173.747	42.501	
0+173.269		7.300		6.00%	3.750	7.969						
	88.000		7.300				739.310	335.280	1,073.600	204.160	49.940	
0+261.269		7.300		0.00%	5.100	5.100						
	79.000		7.300				658.286	300.990	963.800	183.280	44.833	
0+340.269		7.300		-5.40%	7.544	3.852						
	116.628		7.300				1,001.481	444.353	1,422.862	270.577	66.186	
0+456.897		7.300		-5.40%	7.544	3.852						
	79.000		7.300				658.286	300.990	963.800	183.280	44.833	
0+535.897		7.300		0.00%	5.100	5.100						
	81.000		7.300				674.952	308.610	988.200	187.920	45.968	
0+616.897		7.300		5.40%	3.852	7.544						
	118.941		7.300				1,021.343	453.165	1,451.080	275.943	67.499	
0+735.838		7.300		5.40%	3.852	7.544						
	12.819		7.300				109.156	48.840	156.392	29.740	7.275	
0+748.657		7.300		4.64%	3.989	7.070						
	0.000		9.779				0.000	0.000	0.000	0.000	0.000	
0+748.657		12.258		4.64%	3.989	7.070						
	78.798		9.909				516.889	309.889	1,013.263	197.925	48.993	Vertical left
0+827.455		7.560		0.00%	5.100	5.100						
	24.545		7.465				130.539	78.532	255.636	49.655	12.261	Vertical left
0+852.000		7.370		-1.50%	5.604	4.679						
	26.530		7.335				137.688	83.848	272.861	52.980	13.081	Vertical left
0+878.530		7.300		-1.50%	5.604	4.679						
SUB-TOTAL							6,996.348	3,314.290	10,665.431	2,041.358	500.796	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE - RAMP 3	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer	RAMP 3	Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- RAMP 4 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	6,466.631	
3030101	AGGREGATE BASE COURSE	M^3	3,134.756	
4020102	PRIME COAT (mc1)	M^2	10,088.926	
4050101	BIT. BASE COURSE	M^3	1,931.323	
4050301	BIT. WEARING COURSE	M^3	473.835	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- RAMP 4	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor :
DAR AL HANDASAH		***AL RAHJI ALLIANCE***

PAVEMENT COMPUTATION

Project : **HHR - AIR DEFENSE INTERCHANGE- RAMP 4** Page: _2__ of __2__

Item : ***20601*** **SUBGRADE** Drwg. No. _____

3030101 **AGGREGATE BASE COURSE**

4020102 **PRIME COAT (mc1)**

4050101 **BIT. BASE COURSE**

4050301 **BIT. WEARING COURSE**

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079
Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
								+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
								+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
RAMP 4												
0+000.000		7.300		-1.50%	5.604	4.679						
	67.300		8.175				372.261	229.661	748.713	145.705	36.009	Vertical left
0+067.300		9.050		0.00%	5.100	5.100						
	67.338		11.317				474.137	293.254	960.678	188.095	46.606	Vertical left
0+134.638		13.583		5.10%	3.905	7.349						
	6.528		14.121				54.575	33.920	111.436	21.896	5.433	Vertical left
0+141.166		14.658		5.10%	3.905	7.349						
	0.000		11.388				0.000	0.000	0.000	0.000	0.000	
0+141.166		8.117		5.10%	3.905	7.349						
	20.094		7.709				173.791	79.021	253.355	48.260	11.814	
0+161.260		7.300		5.10%	3.905	7.349						
	164.456		7.300				1,402.212	626.577	2,006.363	381.538	93.329	
0+325.716		7.300		5.10%	3.905	7.349						
	53.000		7.300				440.967	201.930	646.600	122.960	30.078	
0+378.716		7.300		1.50%	4.679	5.604						
	175.643		7.300				1,425.150	669.200	2,142.845	407.492	99.677	
0+554.359		7.300		1.50%	4.679	5.604						
	61.846		7.300				520.678	235.633	754.521	143.483	35.098	
0+616.205		7.300		6.00%	3.750	7.969						
	74.138		7.300				646.779	282.466	904.484	172.000	42.073	
0+690.343		7.300		6.00%	3.750	7.969						
	60.524		7.300				509.548	230.596	738.393	140.416	34.347	
0+750.867		7.300		1.50%	4.679	5.604						
	20.476		7.300				111.912	64.499	209.879	40.747	10.060	Vertical left
0+771.343		7.300		0.00%	5.100	5.100						
	45.123		7.300				253.405	142.137	462.511	89.795	22.169	Vertical left
0+816.466		7.300		3.20%	4.279	6.312						
	14.877		7.076				81.214	45.861	149.149	28.937	7.142	Vertical left
0+831.343		6.851		-1.50%	5.604	4.679						
SUB-TOTAL							6,466.631	3,134.756	10,088.926	1,931.323	473.835	

Suprv'g. Consultant :		Contractor :
DAR AL HANDASAH	***HHR - AIR DEFENSE INTERCHANGE- RAMP 4***	***AL RAHJI ALLIANCE***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- RAMP 5 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	4,124.286	
3030101	AGGREGATE BASE COURSE	M^3	2,033.959	
4020102	PRIME COAT (mc1)	M^2	6,563.066	
4050101	BIT. BASE COURSE	M^3	1,260.582	
4050301	BIT. WEARING COURSE	M^3	309.736	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- RAMP 5	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- RAMP 5 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
RAMP 5												
0+000.000		7.300		1.50%	4.679	5.604						
	37.031		8.066				214.868	125.152	407.915	79.361	19.611	Vertical left
0+037.031		8.831		1.50%	4.679	5.604						
	50.995		10.257				344.393	205.872	673.491	131.638	32.593	Vertical left
0+088.026		11.683		4.50%	4.016	6.986						
	15.533		12.448				119.673	72.918	239.177	46.903	11.630	Vertical left
0+103.559		13.213		4.50%	4.016	6.986						
	0.000		10.257				0.000	0.000	0.000	0.000	0.000	
0+103.559		7.300		4.50%	4.016	6.986						
	330.637		7.300				2,783.749	1,259.727	4,033.771	767.078	187.636	
0+434.196		7.300		4.50%	4.016	6.986						
	0.000		9.781				0.000	0.000	0.000	0.000	0.000	
0+434.196		12.261		4.50%	4.016	6.986						
	45.230		10.244				318.558	182.415	596.742	116.635	28.878	Vertical left
0+479.426		8.226		4.50%	4.016	6.986						
	57.124		7.763				343.045	187.875	611.969	118.966	29.387	Vertical left
0+536.550		7.300		1.50%	4.679	5.604						
SUB-TOTAL							4,124.286	2,033.959	6,563.066	1,260.582	309.736	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- RAMP 5	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- RAMP 6 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	2,776.962	
3030101	AGGREGATE BASE COURSE	M^3	1,214.296	
4020102	PRIME COAT (mc1)	M^2	3,874.946	
4050101	BIT. BASE COURSE	M^3	733.540	
4050301	BIT. WEARING COURSE	M^3	179.072	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- RAMP 6	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- RAMP 6

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Item :

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
RAMP 6												
0+000.000		3.650		-1.50%	5.604	4.679						
	39.483		4.325				170.142	89.133	287.239	55.079	13.525	Vertical left
0+039.483		5.000		-1.10%	5.460	4.784						
	10.517		5.393				49.630	27.110	87.738	16.917	4.164	Vertical left
0+050.000		5.785		0.00%	5.100	5.100						
	31.640		8.322				188.335	109.367	356.646	69.431	17.162	Vertical left
0+081.640		10.859		3.49%	4.216	6.453						
	0.000		7.930				0.000	0.000	0.000	0.000	0.000	
0+081.640		5.000		3.49%	4.216	6.453						
	16.360		5.000				126.665	51.043	161.964	30.430	7.403	
0+098.000		5.000		5.40%	3.852	7.544						
	113.056		5.000				892.800	352.735	1,119.254	210.284	51.158	
0+211.056		5.000		5.40%	3.852	7.544						
	54.574		5.000				418.061	170.271	540.283	101.508	24.695	
0+265.630		5.000		1.50%	4.679	5.604						
	96.066		5.588				730.131	316.672	1,007.540	189.980	46.294	
0+361.696		6.176		1.50%	4.679	5.604						
	3.676		6.393				28.826	13.005	41.513	7.861	1.919	
0+365.372		6.610		1.50%	4.679	5.604						
	3.554		5.805				15.481	8.535	27.561	5.299	1.303	vertical right
0+368.926		5.000		1.50%	4.679	5.604						
	0.712		5.785				3.097	1.705	5.507	1.059	0.260	vertical right
0+369.638		6.569		1.50%	4.679	5.604						
	3.297		5.785				14.341	7.897	25.501	4.902	1.205	vertical right
0+372.935		5.000		1.50%	4.679	5.604						
	4.450		8.913				23.532	14.835	48.338	9.401	2.323	vertical right
0+377.385		12.825		1.50%	4.679	5.604						
	3.203		9.699				28.294	14.509	46.761	8.968	2.202	
0+380.588		6.573		1.50%	4.679	5.604						
	4.763		5.787				36.484	15.984	50.900	9.608	2.343	
0+385.351		5.000		1.50%	4.679	5.604						
	6.889		5.000				51.143	21.494	68.201	12.814	3.117	
0+392.240		5.000		1.50%	4.679	5.604						
SUB-TOTAL							2,776.962	1,214.296	3,874.946	733.540	179.072	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- RAMP 6	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- RAMP 7 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	2,537.655	
3030101	AGGREGATE BASE COURSE	M^3	1,167.864	
4020102	PRIME COAT (mc1)	M^2	3,747.132	
4050101	BIT. BASE COURSE	M^3	714.447	
4050301	BIT. WEARING COURSE	M^3	174.973	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- RAMP 7	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

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Item :

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.9600) x D	2.95) x D	+0.5300) x D	+0.1263) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq.. m).	(Cu. m).	(Cu. m).	
RAMP 7												
0+000.000		10.913		1.50%	4.679	5.604						
	31.131		10.413				282.899	147.682	476.709	91.606	22.512	
0+031.131		9.913		2.67%	4.395	6.075						
	6.253		11.441				36.984	25.588	83.731	16.371	4.054	vertical right
0+037.384		12.968		2.91%	4.342	6.179						
	1.235		12.664				7.741	5.507	18.048	3.536	0.876	vertical right
0+038.619		12.360		2.96%	4.332	6.200						
	3.804		11.539				22.526	15.678	51.310	10.034	2.485	vertical right
0+042.423		10.717		3.10%	4.300	6.265						
	1.217		11.752				7.274	5.094	16.675	3.262	0.808	vertical right
0+043.640		12.786		3.15%	4.290	6.287						
	2.465		12.200				15.049	10.649	34.880	6.828	1.692	vertical right
0+046.105		11.614		3.24%	4.270	6.330						
	0.559		12.069				3.388	2.393	7.836	1.534	0.380	vertical right
0+046.664		12.523		3.26%	4.266	6.340						
	3.336		13.427				21.554	15.640	51.298	10.059	2.494	vertical right
0+050.000		14.331		3.39%	4.239	6.400						
	2.199		15.000				15.225	11.347	37.272	7.322	1.817	vertical right
0+052.199		15.668		3.47%	4.221	6.441						
	1.089		15.997				7.860	5.945	19.544	3.844	0.954	vertical right
0+053.288		16.326		3.51%	4.213	6.461						
	3.319		17.289				25.215	19.405	63.853	12.571	3.122	vertical right
0+056.607		18.251		3.64%	4.187	6.523						
	9.221		16.047				66.431	50.477	165.950	32.637	8.102	vertical right
0+065.828		13.843		3.98%	4.116	6.702						
	0.000		11.343				0.000	0.000	0.000	0.000	0.000	vertical right
0+065.828		8.843		3.98%	4.116	6.702						
	16.037		9.871				85.182	58.072	189.565	36.951	9.138	vertical right
0+081.865		10.898		4.59%	3.999	7.037						
	0.000		7.949				0.000	0.000	0.000	0.000	0.000	
0+081.865		5.000		4.59%	3.999	7.037						
	21.550		5.000				168.529	67.236	213.345	40.083	9.751	
0+103.415		5.000		5.40%	3.852	7.544						
	184.517		5.000				1,457.125	575.693	1,826.718	343.202	83.494	
0+287.932		5.000		5.40%	3.852	7.544						
	0.000		7.492				0.000	0.000	0.000	0.000	0.000	
0+287.932		9.984		5.40%	3.852	7.544						
	7.867		8.880				54.056	28.510	93.067	18.141	4.487	Vertical left
0+295.799		7.776		5.40%	3.852	7.544						
	16.245		6.388				95.977	46.727	151.696	29.364	7.240	Vertical left
0+312.044		5.000		3.65%	4.184	6.530						
	33.755		4.327				164.641	76.222	245.635	47.102	11.566	Vertical left
0+345.799		3.654		1.50%	4.679	5.604						
SUB-TOTAL							2,537.655	1,167.864	3,747.132	714.447	174.973	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- RAMP 7	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer	RAMP 7	Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 1 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	2,867.546	
3030101	AGGREGATE BASE COURSE	M^3	1,284.916	
4020102	PRIME COAT (mc1)	M^2	4,114.600	
4050101	BIT. BASE COURSE	M^3	782.491	
4050301	BIT. WEARING COURSE	M^3	191.412	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 1	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 1 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.6200) x D	(W + 4.90) x D	(0.20 W +0.8600) x D	(0.05 W +0.2025) x D	
							VAR x D	+0.8100) x D	2.45) x D	+0.4300) x D	+0.1013) x D	Vertical left
							VAR x D	+0.8100) x D	2.45) x D	+0.4300) x D	+0.1013) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq. m).	(Cu. m).	(Cu. m).	
Service Road 1												
0+000.000		7.300		1.50%	5.604	5.604						
	328.805		7.300				2,797.223	1,252.747	4,011.421	762.828	186.597	
0+328.805		7.300		1.50%	5.604	5.604						
	2.105		7.533				18.058	8.167	26.170	4.981	1.219	
0+330.910		7.765		1.50%	5.604	5.604						
	5.266		7.533				45.166	20.431	65.470	12.462	3.050	
0+336.176		7.300		1.50%	5.604	5.604						
	1.456		5.475				7.098	3.571	11.539	2.220	0.546	Vertical left
0+337.632		3.650		1.50%	5.604	5.604						
SUB-TOTAL							2,867.546	1,284.916	4,114.600	782.491	191.412	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 1	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 2 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	685.942	
3030101	AGGREGATE BASE COURSE	M^3	375.612	
4020102	PRIME COAT (mc1)	M^2	1,203.643	
4050101	BIT. BASE COURSE	M^3	229.113	
4050301	BIT. WEARING COURSE	M^3	56.069	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 2	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 2 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.3200) x D	(W + 3.90) x D	(0.20 W +0.6600) x D	(0.05 W +0.1525) x D	
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq. m).	(Cu. m).	(Cu. m).	
Service Road 2												
0+000.000		3.902		1.500%	0.000	5.604						
	1.567		5.506				4.739	3.622	11.683	2.243	0.551	Vertical left
0+001.567		7.109		1.500%	0.000	5.604						
	0.090		7.205				0.318	0.254	0.824	0.159	0.039	Vertical left
0+001.657		7.300		1.500%	0.000	5.604						
	8.978		7.695				53.379	32.575	104.095	19.742	4.823	
0+010.635		8.089		1.500%	0.000	5.604						
	3.438		7.695				20.435	12.474	39.862	7.560	1.847	
0+014.073		7.300		1.500%	0.000	5.604						
	53.658		7.300				365.928	188.340	600.970	113.755	27.768	
0+067.731		7.300		1.500%	4.679	5.604						
	5.000		9.783				27.446	17.974	58.663	11.433	2.827	Vertical right
0+072.731		12.265		1.500%	4.679	0.000						
	2.609		9.965				14.464	9.522	31.086	6.061	1.499	Vertical right
0+075.340		7.665		1.500%	4.679	0.000						
	3.319		8.422				16.863	10.576	34.423	6.685	1.651	Vertical right
0+078.659		9.178		1.500%	4.679	0.000						
	0.603		8.516				3.081	1.939	6.311	1.226	0.303	Vertical right
0+079.262		7.854		1.500%	4.679	0.000						
	3.322		8.611				17.067	10.774	35.082	6.817	1.684	Vertical right
0+082.584		9.367		1.500%	4.679	0.000						
	0.603		8.832				3.138	1.996	6.501	1.264	0.312	Vertical right
0+083.187		8.296		1.500%	4.679	0.000						
	0.655		8.185				3.281	2.041	6.638	1.288	0.318	Vertical right
0+083.842		8.074		1.500%	4.679	5.604						
	21.838		8.350				155.803	83.527	267.505	50.880	12.447	
0+105.680		8.625		1.500%	0.000	5.604						
SUB-TOTAL							685.942	375.612	1,203.643	229.113	56.069	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 2	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 3 — Page: __1_ of _2_

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M^3	1,139.256	
3030101	AGGREGATE BASE COURSE	M^3	501.721	
4020102	PRIME COAT (mc1)	M^2	1,604.661	
4050101	BIT. BASE COURSE	M^3	304.674	
4050301	BIT. WEARING COURSE	M^3	74.476	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 3	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 3 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.3200) x D	(W + 3.90) x D	(0.20 W +0.6600) x D	(0.05 W +0.1525) x D	
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical left
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq. m).	(Cu. m).	(Cu. m).	
Service Road 3												
0+000.000		5.003		1.500%	5.604	5.604						
	2.304		5.654				11.011	5.429	17.520	3.366	0.827	Vertical left
0+002.304		6.305		1.500%	5.604	5.604						
	1.004		6.297				4.992	2.559	8.280	1.596	0.393	Vertical left
0+003.308		6.289		1.500%	5.604	5.604						
	2.832		7.189				14.838	7.977	25.882	5.006	1.234	Vertical left
0+006.140		8.089		1.500%	5.604	5.604						
	2.022		8.732				11.530	6.631	21.598	4.198	1.037	Vertical left
0+008.162		9.374		1.500%	5.604	5.604						
	0.996		9.691				5.966	3.553	11.594	2.259	0.559	Vertical left
0+009.158		10.007		1.500%	5.604	5.604						
	3.035		10.972				19.346	11.993	39.217	7.661	1.896	Vertical left
0+012.193		11.936		1.500%	5.604	5.604						
	9.045		10.350				82.527	40.024	128.891	24.693	6.060	
0+021.238		8.764		1.500%	5.604	5.604						
	5.259		8.032				44.326	19.614	62.750	11.919	2.914	
0+026.497		7.300		1.500%	5.604	5.604						
	115.083		7.300				944.721	403.941	1,288.930	243.976	59.555	
0+141.580		7.300		1.500%	5.604	5.604						
SUB-TOTAL							1,139.256	501.721	1,604.661	304.674	74.476	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 3	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 4 Page: __1_ of _2_

Item : 20601 SUBGRADE Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
20601	SUBGRADE	M³	2,369.963	
3030101	AGGREGATE BASE COURSE	M³	947.869	
4020102	PRIME COAT (mc1)	M²	3,006.895	
4050101	BIT. BASE COURSE	M³	564.737	
4050301	BIT. WEARING COURSE	M³	137.369	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 4	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 4 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.1700) x D	(W + 3.40) x D	(0.20 W +0.5600) x D	(0.05 W +0.1275) x D	
							VAR x D	+0.6600) x D	1.95) x D	+0.3300) x D	+0.0763) x D	Vertical left
							VAR x D	+0.5100) x D	1.45) x D	+0.2300) x D	+0.0513) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq. m).	(Cu. m).	(Cu. m).	
Service Road 4												
0+000.000		5.000		1.50%	4.679	5.604						
	15.302		5.000				70.125	33.052	106.349	20.352	4.993	Vertical left
0+015.302		5.000		1.50%	4.679	5.604						
	1.195		5.000				5.486	2.581	8.305	1.589	0.390	Vertical left
0+016.497		5.000		1.61%	4.652	5.644						
	46.805		5.000				339.688	124.969	393.162	73.016	17.669	
0+063.302		5.000		5.80%	3.783	7.822						
	50.528		5.000				380.771	134.910	424.435	78.824	19.074	
0+113.830		5.000		5.80%	3.783	7.822						
	2.450		5.000				18.405	6.542	20.580	3.822	0.925	
0+116.280		5.000		5.59%	3.819	7.675						
SUB-TOTAL							814.474	302.054	952.831	177.602	43.051	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 4	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 4 — Page: 2 of 2

Item :

20601	SUBGRADE
3030101	AGGREGATE BASE COURSE
4020102	PRIME COAT (mc1)
4050101	BIT. BASE COURSE
4050301	BIT. WEARING COURSE

Drwg. No. _____

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079
Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.9200) x D	(W + 5.90) x D	(0.20 W +1.0600) x D	(0.05 W +0.2525) x D	
							VAR x D	+1.4100) x D	4.45) x D	+0.8300) x D	+0.2013) x D	Vertical left
							VAR x D	+0.5100) x D	1.45) x D	+0.2300) x D	+0.0513) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq. m).	(Cu. m).	(Cu. m).	
Service Road 4												
0+116.280		5.000		5.59%	3.819	7.675						
	48.080		5.000				383.734	164.434	524.072	99.045	24.160	
0+164.360		5.000		1.50%	4.679	5.604						
	16.140		5.000				124.664	55.199	175.926	33.248	8.110	
0+180.500		5.000		1.50%	4.679	5.604						
	50.000		5.000				401.447	171.000	545.000	103.000	25.125	
0+230.500		5.000		6.00%	3.750	7.969						
SUB-TOTAL							909.845	390.632	1,244.998	235.293	57.396	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 4	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

PAVEMENT COMPUTATION

Project : HHR - AIR DEFENSE INTERCHANGE- SR 4 — Page: _2__ of __2__

Item : 20601 SUBGRADE — Drwg. No. _____

3030101 AGGREGATE BASE COURSE

4020102 PRIME COAT (mc1)

4050101 BIT. BASE COURSE

4050301 BIT. WEARING COURSE

Note:

Rounding is already deducted in subgrade computation.

Rounding Left= 0.0079

Rounding Right= 0.0061

STATION	DIST. (m.)	WIDTH	AVE. WIDTH	SUPER ELEVATION	VARIABLE 1	VARIABLE 2	SUB-GRADE	AGG. BASE COURSE	PRIME COAT	BIT. BASE COURSE	BIT. WEARING COURSE	REMARKS
							(0.30 W VAR x D	(0.30 W +1.0200) x D	(W + 2.90) x D	(0.20 W +0.4600) x D	(0.05 W +0.1025) x D	
							VAR x D	+0.5100) x D	1.45) x D	+0.2300) x D	+0.0513) x D	Vertical left
							VAR x D	+0.5100) x D	1.45) x D	+0.2300) x D	+0.0513) x D	Vertical right
							(Cu. m.)	(Cu. m).	(Sq. m).	(Cu. m).	(Cu. m).	
Service Road 4												
0+230.500		5.000		6.00%	3.750	7.969						
	28.843		6.083				223.790	82.055	259.097	48.358	11.729	
0+259.343		7.166		6.00%	3.750	7.969						
	50.000		7.233				389.942	159.495	506.650	95.330	23.208	
0+309.343		7.300		1.50%	4.679	5.604						
	4.247		7.300				31.912	13.633	43.319	8.154	1.985	
0+313.590		7.300		1.50%	4.679	5.604						
SUB-TOTAL							645.644	255.183	809.066	151.842	36.922	

Suprv'g. Consultant : DAR AL HANDASAH	HHR - AIR DEFENSE INTERCHANGE- SR 4	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

SEC .5

المنشآت

PART: 5 CONCRETE ,STEEL & STRUCTURES

book.engineering-services-center.com

RETAINING WALLS TYPE 1,2,3

Ministry TYPE 1

الجدران الاستنادية

(BEARING CAPACITY = 4.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
12.00	0.50	1.50	1.60	4.00	1.30	–	#16 @ 10 L = 8.00	#32 @ 10 L = 8.00	#16 @ 15	#32 @ 18 L = 3.77	#32 @ 18 L = 7.20	#32 @ 18 L = 10.37	#25 @ 27 L = 5.52	#16 @ 15 L = 12.00	#16 @ 15 L = 2.52	#16 @ 15	#16 @ 15	#14 @ 15	–	19.77	1881.53
11.00	0.50	1.23	1.50	3.60	1.20	–	#16 @ 11 L = 7.03	#32 @ 11 L = 7.03	#16 @ 15	#32 @ 20 L = 3.67	#32 @ 20 L = 6.79	#32 @ 20 L = 9.70	#25 @ 30 L = 5.19	#16 @ 15 L = 11.60	#16 @ 15 L = 1.82	#16 @ 14	#14 @ 14	#14 @ 15	–	16.77	1576.16
10.00	0.40	1.07	1.20	3.20	1.00	–	#16@12.5 L = 6.27	#32@12.5 L = 6.27	#16 @ 15	#30 @ 20 L = 3.21	#32 @ 20 L = 6.37	#30 @ 20 L = 8.77	#25 @ 30 L = 4.86	#16 @ 15 L = 10.80	#16 @ 15 L = 1.65	#16 @ 15	#14 @ 15	#12 @ 15	–	12.80	1314.06
9.00	0.40	1.00	1.10	2.80	0.90	–	#16 @ 14 L = 5.60	#32 @ 14 L = 5.60	#16 @ 15	#28 @ 20 L = 2.86	#28 @ 20 L = 5.48	#28 @ 20 L = 7.86	#22 @ 30 L = 4.25	#16 @ 15 L = 9.50	#16 @ 15 L = 1.52	#16 @ 15	#14 @ 15	#12 @ 15	–	10.71	1039.82
8.00	0.40	0.94	1.00	2.50	0.80	–	#16 @ 15 L = 5.03	#30 @ 15 L = 5.03	#16 @ 15	#22 @ 20 L = 2.13	#25 @ 20 L = 4.70	#22 @ 20 L = 6.58	#16 @ 30 L = 3.65	#16 @ 20 L = 8.50	#16 @ 20 L = 1.42	#16 @ 15	#14 @ 15	#12 @ 15	–	8.52	719.00
7.00	0.30	0.77	0.90	2.20	0.70	–	#14 @ 15 L = 4.37	#26 @ 15 L = 4.37	#14 @ 15	#22 @ 20 L = 2.03	#22 @ 20 L = 4.02	#22 @ 20 L = 5.58	#16 @ 30 L = 3.22	#16 @ 20 L = 7.40	#16 @ 20 L = 1.32	#14 @ 15	#12 @ 15	#12 @ 15	–	6.44	584.95
6.00	0.30	0.70	0.80	1.80	0.60	–	#14 @ 18 L = 3.70	#25 @ 15 L = 3.70	#14 @ 15	#18 @ 20 L = 1.68	#22 @ 20 L = 3.39	#22 @ 20 L = 4.69	#16 @ 30 L = 2.74	#16 @ 20 L = 6.40	#16 @ 20 L = 1.22	#14 @ 15	#12 @ 15	#12 @ 15	–	4.92	409.95
5.00	0.25	0.58	0.60	1.50	0.50	–	#14 @ 14 L = 3.10	#18 @ 14 L = 3.10	#14 @ 14	#16 @ 20 L = 1.34	#16 @ 20 L = 2.84	#18 @ 20 L = 4.08	#16 @ 30 L = 2.41	#16 @ 20 L = 5.38	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	–	3.53	285.35
4.00	0.25	0.52	0.50	1.20	0.50	–	#14 @ 15 L = 2.62	#16 @ 15 L = 2.62	#14 @ 15	#16@12.5 L = 1.34	–	#16@12.5 L = 2.41	#16 @ 25 L = 2.05	#16 @ 20 L = 4.35	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	–	2.69	225.52
3.00	0.20	0.46	0.50	1.00	0.40	–	#14 @ 18 L = 2.10	#14 @ 18 L = 2.10	#14 @ 18	#16 @ 15 L = 1.24	–	#15 @ 15 L = 2.74	#15 @ 30 L = 1.74	#14 @ 20 L = 3.30	#14 @ 20 L = 0.88	#12 @ 15	#12 @ 15	#12 @ 15	–	1.86	166.48

(BEARING CAPACITY = 3.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
12.00	0.50	1.30	2.00	4.50	1.30	–	#16 @ 10 L = 8.20	#32 @ 10 L = 8.20	#16 @ 15	#32 @ 18 L = 3.77	#32 @ 18 L = 7.20	#32 @ 18 L = 10.37	#25 @ 27 L = 5.52	#16 @ 15 L = 12.00	#16 @ 15 L = 2.52	#16 @ 15	#16 @ 15	#14 @ 15	–	21.55	2040.15
11.00	0.50	1.23	1.80	4.20	1.20	–	#16 @ 12 L = 6.25	#32 @ 12 L = 6.25	#16 @ 15	#32 @ 20 L = 3.67	#32 @ 20 L = 6.80	#32 @ 20 L = 9.70	#25 @ 30 L = 5.19	#16 @ 15 L = 11.60	#16 @ 15 L = 1.82	#16 @ 15	#16 @ 15	#14 @ 15	–	18.21	1681.62
10.00	0.40	1.07	1.50	3.60	1.00	–	#16@12.5 L = 6.87	#32@12.5 L = 6.87	#16 @ 15	#30 @ 20 L = 3.21	#32 @ 20 L = 6.37	#30 @ 20 L = 8.77	#25 @ 30 L = 4.86	#16 @ 15 L = 10.80	#16 @ 15 L = 1.65	#16 @ 15	#14 @ 15	#12 @ 15	–	13.50	1386.30
9.00	0.40	1.00	1.20	3.20	0.90	–	#16 @ 14 L = 6.10	#32 @ 14 L = 6.10	#16 @ 15	#28 @ 20 L = 2.86	#28 @ 20 L = 5.48	#28 @ 20 L = 7.86	#22 @ 30 L = 4.25	#16 @ 15 L = 9.50	#16 @ 15 L = 1.52	#16 @ 15	#14 @ 15	#12 @ 15	–	11.15	1077.80
8.00	0.40	0.93	1.00	2.70	0.80	–	#16 @ 15 L = 5.23	#32 @ 15 L = 5.23	#16 @ 15	#22 @ 20 L = 2.13	#25 @ 20 L = 4.70	#22 @ 20 L = 6.58	#16 @ 30 L = 3.65	#16 @ 20 L = 8.50	#16 @ 20 L = 1.42	#16 @ 15	#14 @ 15	#12 @ 15	–	9.04	784.00
7.00	0.30	0.77	0.90	2.20	0.70	–	#14 @ 15 L = 4.37	#28 @ 15 L = 4.37	#14 @ 15	#22 @ 20 L = 2.03	#25 @ 20 L = 4.29	#22 @ 20 L = 5.58	#16 @ 30 L = 3.22	#16 @ 20 L = 7.40	#16 @ 20 L = 1.32	#14 @ 15	#14 @ 15	#12 @ 15	–	6.44	577.90
6.00	0.30	0.70	0.80	1.80	0.60	–	#14 @ 18 L = 3.70	#25 @ 15 L = 3.70	#14 @ 15	#18 @ 20 L = 1.68	#22 @ 20 L = 3.39	#22 @ 20 L = 4.69	#16 @ 30 L = 2.74	#16 @ 20 L = 6.40	#16 @ 20 L = 1.22	#14 @ 15	#12 @ 15	#12 @ 15	–	4.92	410.00
5.00	0.25	0.58	0.60	1.50	0.50	–	#14 @ 14 L = 3.10	#18 @ 14 L = 3.10	#14 @ 15	#16 @ 20 L = 1.34	#16 @ 20 L = 2.84	#18 @ 20 L = 4.08	#16 @ 30 L = 2.41	#16 @ 20 L = 5.38	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	–	3.53	283.40
4.00	0.25	0.52	0.50	1.20	0.50	–	#14 @ 15 L = 2.62	#16 @ 15 L = 2.62	#14 @ 15	#16@12.5 L = 1.34	–	#16@12.5 L = 2.41	#16 @ 25 L = 2.05	#16 @ 20 L = 4.35	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	–	2.69	225.50
3.00	0.20	0.46	0.50	1.00	0.40	–	#14 @ 15 L = 2.10	#14 @ 15 L = 2.10	#14 @ 15	#16 @ 15 L = 1.24	–	#15 @ 15 L = 2.74	#15 @ 30 L = 1.74	#14 @ 20 L = 3.30	#16 @ 20 L = 1.02	#12 @ 15	#12 @ 15	#12 @ 15	–	1.86	167.20

(BEARING CAPACITY = 2.50 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
12.00	0.50	1.30	2.50	4.80	1.30	–	#25@12.5 L = 9.50	#32@12.5 L = 9.50	#16 @ 15	#32 @ 18 L = 3.77	#32 @ 18 L = 7.20	#32 @ 18 L = 10.37	#25 @ 27 L = 5.52	#16 @ 15 L = 12.00	#16 @ 15 L = 2.52	#16 @ 15	#16 @ 15	#14 @ 15	–	22.11	2085.19
11.00	0.50	1.23	2.00	4.80	1.20	–	#20@12.5 L = 8.03	#32@12.5 L = 8.03	#16 @ 15	#32 @ 20 L = 3.67	#32 @ 20 L = 6.79	#32 @ 20 L = 9.70	#25 @ 30 L = 5.19	#16 @ 15 L = 11.60	#16 @ 15 L = 1.82	#16 @ 15	#16 @ 15	#14 @ 15	–	19.17	1762.55
10.00	0.40	1.07	1.60	4.40	1.10	–	#18@12.5 L = 7.87	#32@12.5 L = 7.87	#16 @ 15	#30 @ 20 L = 3.21	#32 @ 20 L = 6.28	#30 @ 20 L = 8.77	#25 @ 30 L = 4.86	#16 @ 15 L = 10.80	#16 @ 15 L = 1.72	#16 @ 15	#14 @ 15	#12 @ 15	–	15.11	1437.04
9.00	0.40	1.00	1.30	3.90	1.00	–	#16@12.5 L = 7.00	#25@12.5 L = 7.00	#16 @ 15	#28 @ 20 L = 2.86	#28 @ 20 L = 5.48	#28 @ 20 L = 7.86	#22 @ 30 L = 4.25	#16 @ 15 L = 9.50	#16 @ 15 L = 1.62	#16 @ 15	#14 @ 16	#12 @ 15	–	12.50	1113.50
8.00	0.30	0.83	1.20	3.30	1.00	–	#16 @ 19 L = 6.02	#25 @ 15 L = 6.02	#16 @ 15	#20 @ 20 L = 2.63	#25 @ 20 L = 4.73	#25 @ 20 L = 6.86	#16 @ 30 L = 3.66	#16 @ 20 L = 8.40	#16 @ 20 L = 1.62	#14 @ 15	#14 @ 15	#12 @ 15	–	9.77	842.13
7.00	0.30	0.77	1.00	2.80	0.80	–	#14 @ 15 L = 4.87	#25 @ 15 L = 4.87	#14 @ 15	#22 @ 20 L = 2.23	#22 @ 20 L = 4.02	#22 @ 20 L = 5.86	#16 @ 30 L = 3.22	#16 @ 20 L = 7.40	#16 @ 20 L = 1.52	#14 @ 15	#12 @ 15	#12 @ 15	–	7.57	654.80
6.00	0.30	0.70	0.90	2.00	0.60	–	#14 @ 15 L = 4.10	#22 @ 15 L = 4.10	#14 @ 15	#18 @ 20 L = 1.68	#22 @ 20 L = 3.60	#18 @ 20 L = 4.89	#22 @ 30 L = 3.23	#16 @ 20 L = 6.40	#16 @ 20 L = 1.32	#14 @ 15	#12 @ 15	#12 @ 15	–	4.99	406.49
5.00	0.25	0.58	0.80	1.50	0.50	–	#14 @ 14 L = 3.10	#16 @ 14 L = 3.10	#14 @ 15	#16 @ 20 L = 1.34	#15 @ 20 L = 2.84	#15 @ 20 L = 4.08	#16 @ 30 L = 2.41	#16 @ 20 L = 5.38	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	–	3.58	282.35
4.00	0.25	0.52	0.60	1.20	0.40	–	#14 @ 15 L = 2.62	#16 @ 15 L = 2.62	#14 @ 15	#16@12.5 L = 1.34	–	#16@12.5 L = 2.41	#16 @ 25 L = 2.05	#16 @ 20 L = 4.35	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	–	2.48	221.06
3.00	0.20	0.46	0.50	1.00	0.40	–	#14 @ 15 L = 2.10	#14 @ 15 L = 2.10	#14 @ 15	#16 @ 15 L = 1.24	–	#15 @ 15 L = 2.74	#15 @ 30 L = 1.74	#14 @ 20 L = 3.30	#16 @ 20 L = 1.02	#12 @ 15	#12 @ 15	#12 @ 15	–	1.83	159.15

(BEARING CAPACITY = 2.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
11.00	0.50	1.23	2.60	4.50	1.10	–	#25@12.5 L = 8.87	#30@12.5 L = 8.87	#16 @ 15	#32 @ 20 L = 3.67	#32 @ 20 L = 6.79	#32 @ 20 L = 9.70	#25 @ 30 L = 5.19	#16 @ 15 L = 11.60	#16 @ 15 L = 1.82	#16 @ 15	#16 @ 15	#14 @ 15	–	19.05	1653.20
10.00	0.40	1.07	2.10	4.50	1.00	–	#22@12.5 L = 8.47	#30@12.5 L = 8.47	#16 @ 15	#30 @ 20 L = 3.21	#32 @ 20 L = 6.37	#30 @ 20 L = 8.77	#25 @ 30 L = 4.86	#16 @ 15 L = 10.80	#16 @ 15 L = 1.65	#16 @ 15	#14 @ 15	#12 @ 15	–	15.00	1542.40
9.00	0.40	1.00	1.80	4.00	1.00	–	#18@12.5 L = 7.60	#25@12.5 L = 7.60	#16 @ 15	#28 @ 20 L = 2.86	#28 @ 20 L = 5.48	#28 @ 20 L = 7.86	#22 @ 30 L = 4.25	#16 @ 15 L = 9.50	#16 @ 15 L = 1.52	#16 @ 15	#14 @ 15	#12 @ 15	–	13.10	1129.90
8.00	0.30	0.83	1.50	3.40	0.90	–	#16@12.5 L = 6.43	#25@12.5 L = 6.43	#16 @ 15	#25 @ 20 L = 2.63	#25 @ 20 L = 4.71	#25 @ 20 L = 6.86	#22 @ 30 L = 3.66	#16 @ 20 L = 8.40	#16 @ 20 L = 1.52	#14 @ 15	#12 @ 15	#12 @ 15	–	9.69	678.20
7.00	0.30	0.77	1.10	2.80	0.80	–	#16 @ 15 L = 5.27	#25 @ 15 L = 5.27	#16 @ 15	#22 @ 20 L = 2.13	#22 @ 20 L = 4.01	#22 @ 20 L = 5.86	#16 @ 30 L = 3.22	#16 @ 20 L = 7.40	#16 @ 20 L = 1.42	#14 @ 15	#12 @ 15	#12 @ 15	–	7.47	603.00
6.00	0.30	0.70	1.00	2.00	0.70	–	#14 @ 18 L = 4.20	#20 @ 15 L = 4.20	#14 @ 15	#18 @ 20 L = 1.68	#22 @ 20 L = 3.60	#22 @ 20 L = 4.89	#16 @ 30 L = 2.89	#16 @ 20 L = 6.40	#16 @ 20 L = 1.32	#14 @ 15	#12 @ 15	#12 @ 15	–	5.59	401.20
5.00	0.25	0.58	0.80	1.60	0.50	–	#14 @ 14 L = 3.10	#16 @ 14 L = 3.10	#14 @ 15	#16 @ 20 L = 1.34	#18 @ 20 L = 2.84	#18 @ 20 L = 4.08	#16 @ 30 L = 2.41	#16 @ 20 L = 5.38	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	–	3.53	283.40
4.00	0.25	0.52	0.60	1.20	0.40	–	#14 @ 15 L = 2.62	#16 @ 15 L = 2.62	#14 @ 15	#16@12.5 L = 1.34	–	#16@12.5 L = 2.41	#16 @ 25 L = 2.05	#16 @ 20 L = 4.35	#16 @ 20 L = 1.02	#12 @ 15	#12 @ 15	#12 @ 15	–	2.48	221.70
3.00	0.20	0.46	0.50	1.00	0.40	–	#14 @ 15 L = 2.10	#14 @ 15 L = 2.10	#14 @ 15	#16 @ 15 L = 1.24	–	#15 @ 15 L = 2.74	#15 @ 30 L = 1.74	#15 @ 20 L = 3.30	#16 @ 20 L = 1.02	#12 @ 15	#12 @ 15	#12 @ 15	–	1.82	163.20

(BEARING CAPACITY = 1.50 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
9.00	0.30	0.90	2.50	4.10	1.00	–	#22@12.5 L = 8.50	#25@12.5 L = 8.50	#16 @ 15	#28 @ 20 L = 2.86	#30 @ 20 L = 6.71	#25 @ 28 L = 7.56	#25 @ 30 L = 4.52	#16 @ 15 L = 9.40	#16 @ 15 L = 1.62	#16 @ 15	#14 @ 15	#12 @ 15	–	12.90	1277.56
8.00	0.30	0.83	2.00	3.80	0.90	–	#18@12.5 L = 7.33	#22@12.5 L = 7.33	#16 @ 15	#25 @ L = 2.52	#28 @ 20 L = 5.08	#23 @ 20 L = 6.99	#22 @ 30 L = 3.89	#16 @ 15 L = 8.40	#16 @ 15 L = 1.52	#16 @ 15	#14 @ 15	#12 @ 15	–	10.80	841.50
7.00	0.30	0.77	1.80	3.30	0.80	–	#18 @ 15 L = 6.17	#22 @ 15 L = 6.17	#16 @ 15	#22 @ 20 L = 2.13	#25 @ 20 L = 4.30	#22 @ 20 L = 5.86	#18 @ 30 L = 3.22	#16 @ 20 L = 7.40	#16 @ 20 L = 1.42	#14 @ 15	#12 @ 15	#12 @ 15	–	8.17	634.30
6.00	0.30	0.77	1.10	2.50	0.60	–	#16 @ 15 L = 4.70	#22 @ 15 L = 4.70	#16 @ 15	#18 @ 20 L = 1.68	#22 @ 20 L = 3.60	#22 @ 20 L = 4.89	#16 @ 30 L = 2.89	#16 @ 20 L = 6.40	#16 @ 20 L = 1.22	#14 @ 15	#12 @ 15	#12 @ 15	–	5.58	431.50
5.00	0.30	0.63	0.90	1.80	0.50	–	#14 @ 15 L = 3.63	#20 @ 15 L = 3.63	#14 @ 15	#15 @ 20 L = 1.34	#16 @ 20 L = 2.84	#16 @ 20 L = 4.08	#16 @ 30 L = 2.41	#15 @ 20 L = 5.38	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	–	4.00	307.10
4.00	0.25	0.52	0.60	1.30	0.40	–	#14 @ 15 L = 2.62	#18 @ 15 L = 2.62	#14 @ 15	#15@12.5 L = 1.24	–	#16@12.5 L = 2.41	#16 @ 25 L = 2.05	#15 @ 20 L = 4.35	#16 @ 20 L = 1.02	#12 @ 15	#12 @ 15	#12 @ 15	–	2.50	232.50
3.00	0.25	0.46	0.50	1.00	0.40	–	#14 @ 15 L = 2.10	#16 @ 15 L = 2.15	#14 @ 15	#16 @ 15 L = 1.24	–	#16 @ 15 L = 2.74	#15 @ 30 L = 1.74	#15 @ 20 L = 3.30	#16 @ 20 L = 1.02	#12 @ 15	#12 @ 15	#12 @ 15	–	1.33	174.50

TYP. ELEVATON OF WALL PANEL
(SHOWING DIMENSIONS)

CROSS SECTION
(DIMENSIONS)

TYP. ELEVATON OF WALL PANEL
(SHOWING REINFORCEMENT)

CROSS SECTION
(REINFORCEMENT)

GENERAL NOTES:

1 – DESIGN IS CARRIED OUT ACCORDING TO AASHTO 1989 & M.O.C. SPECIFICATION.

2 – FOUNDATION OF RETAINING WALLS MUST BE ON UNDISTURBED SOIL OF NET BEARING CAPACITY OF VALUES SHOWN ON TABLE WITH A MINIMUM FOUNDATION DEPTH OF 1.5m.

3 – REINFORCED CONCRETE USED, ITS CYLINDER CRUSHING STRENGTH AFTER 28 DAYS IS 280kg/cm² USING SULPHATE RESISITING CEMENT ASTM TYPE V.

4 – BLINDING CONCRETE UNDER FOOTING SHALL HAVE 28 DAYS CYLINDERICAL STRENGTH OF 150kg/cm² WITH MINIMUM THICKNESS OF 10cms.

5 – ALL CONCRETE SURFACES IN CONECT WITH SOIL MUST BE PROTECTED BY SUITABLE COATING AS PER SPECIFICATION.

6 – PERFORATED GRANUAL MATERIAL OF 20cm THICKNESS AT REAR FACE OF RETAINING WALL WITH P.V.C. WEEP PIPE OF DIAMETER 3" Φ 3.00m INCLINED THROUGH THE WALL, SHOULD BE PROVIDED FOR DRAINAGE.

7 – REINFORCING STEEL USED IS GRADE 60, fy = 4200kg/cm USING DEFORMED BARS.

8 – M.O.C. & AASHTO SPECIFICATION MUST BE FOLLOWED DURING CONSTRUCTION AND CURING.

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة المواصلات
MINISTRY OF COMMUNICATIONS
ادارة التصميم
DESIGN DEPARTMENT

(إصلاح الجزء السفلي من علبة ضلع) (المرحلة الثانية)

THE SAUDI ENGINEER
Consulting Engineers & Architects
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المهندس السعودي
مهندسون استشاريون ومعماريون
ص.ب: ٥٣٤١ الرياض هـ ٤٧٩٦٨٨٧

TITLE: عنوان المخطط : STANDARD OF RETAINING WALL TYPE – 1 (back slope normal)		MOC Approval موافقة الوزارة STAMP:
DRWS.N: ST/RW/01	DATE: 01/1415 06/1994	SCALE: 1:100
Drawn: NJD	Designed: NSS	Checked: NSS	Approved: ASA	Date:

040115 / 130694
SADRIWALA / [illegible]

BEARING CAPACITY =4.00 Kg/cm² (Type1)																						
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
12.00	0.50	1.30	1.60	4.00	1.30		Ø16 @10 L=8.00	Ø32 @10 L=8.00	Ø16 @15	Ø32 @18 L=3.77	Ø32 @18 L=7.20	Ø32 @18 L=10.37	Ø25 @27 L=5.52	Ø16 @ 15 L=12.00	Ø16 @ 15 L=2.52	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15		19.77	1881.83
11.00	0.50	1.23	1.30	3.50	1.20		Ø16 @11 L=7.03	Ø32 @11 L=7.03	Ø16 @15	Ø32 @ 20 L=3.67	Ø32 @20 L=6.79	Ø32 @20 L=9.70	Ø25 @30 L=5.19	Ø16 @ 15 L=11.60	Ø16 @ 15 L=1.82	Ø16 @ 14	Ø14 @ 14	Ø14 @ 15		16.77	1576.18
10.00	0.40	1.07	1.20	3.20	1.00		Ø16 @12.5 L=6.27	Ø32 @12.5 L=6.27	Ø16 @15	Ø30 @20 L=3.21	Ø32 @20 L=6.37	Ø30 @20 L=8.77	Ø25 @30 L=4.86	Ø16 @ 15 L=10.50	Ø16 @ 15 L=1.65	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		12.80	1314.06
9.00	0.40	1.00	1.10	2.80	0.90		Ø16 @14 L=5.60	Ø32 @14 L=5.60	Ø16 @15	Ø28 @20 L=2.86	Ø28 @20 L=5.45	Ø28 @20 L=7.86	Ø22 @30 L=4.23	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.52	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		10.71	1039.82
8.00	0.40	0.93	1.00	2.50	0.80		Ø16 @15 L=5.03	Ø30 @15 L=5.03	Ø16 @15	Ø22 @ 20 L= 2.13	Ø25 @ 20 L= 4.70	Ø22 @20 L=6.56	Ø18 @30 L=3.55	Ø16 @ 20 L=8.50	Ø16 @ 20 L=1.42	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		8.88	719.00
7.00	0.30	0.77	0.90	2.20	0.70		Ø14 @15 L=4.37	Ø28 @15 L=4.37	Ø14 @15	Ø22 @20 L=2.03	Ø22 @20 L=4.02	Ø22 @ 20 L=5.89	Ø16 @30 L=3.22	Ø16 @ 20 L=7.40	Ø16 @ 20 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		6.44	584.95
6.00	0.30	0.70	0.80	1.80	0.60		Ø14 @15 L=3.70	Ø25 @15 L=3.70	Ø14 @15	Ø18 @20 L=1.59	Ø22 @20 L=3.59	Ø18 @20 L=4.89	Ø16 @30 L=2.74	Ø16 @ 20 L=6.40	Ø16 @ 20 L=1.22	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		4.98	409.98
5.00	0.25	0.58	0.80	1.50	0.50	-	Ø14 @14 L=3.18	Ø18 @14 L=3.18	Ø14 @14	Ø16 @ 20 L=1.34	Ø18 @20 L=2.84	Ø16 @20 L=4.08	Ø16 @30 L=2.41	Ø16 @20 L=5.35	Ø16 @20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		3.53	283.36
4.00	0.25	0.52	0.60	1.20	0.50	-	Ø14 @15 L=2.62	Ø16 @15 L=2.62	Ø14 @15	Ø16 @12.5 L=1.34		Ø16 @12.5 L=3.41	Ø16 @ 25 L=2.06	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.69	225.52
3.00	0.20	0.40	0.50	1.00	0.40	-	Ø14 @15 L=2.10	Ø14 @15 L=2.10	Ø14 @15	Ø16 @15 L=1.24		Ø16 @ 15 L=2.74	Ø16 @ 30 L=1.74	Ø14 @ 20 L=3.30	Ø14 @ 20 L=0.89	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		1.66	158.45

Retain Wall TYPE 1

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m^3	Steel (Kg)
12.00	0.50	1.30	2.00	4.80	1.30		Ø16 @10 L=9.20	Ø32 @10 L=9.20	Ø16 @15	Ø32 @18 L=3.77	Ø32 @18 L=7.20	Ø32 @18 L=10.37	Ø25 @27 L=5.52	Ø16 @ 15 L=12.00	Ø16 @ 15 L=2.52	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15		21.33	2040.15
11.00	0.50	1.23	1.50	4.20	1.20		Ø18 @12 L=8.23	Ø32 @12.5 L=8.23	Ø16 @15	Ø32 @ 20 L=3.67	Ø32 @20 L=6.80	Ø32 @20 L=9.70	Ø25 @30 L=5.19	Ø16 @ 15 L=11.60	Ø16 @ 15 L=1.82	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15		18.21	1681.62
10.00	0.40	1.07	1.50	3.60	1.00		Ø18 @12.5 L=6.97	Ø32 @12.5 L=6.97	Ø16 @15	Ø30 @20 L=3.21	Ø32 @20 L=6.37	Ø30 @20 L=8.77	Ø25 @30 L=4.86	Ø16 @ 15 L=10.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		13.50	1396.30
9.00	0.40	1.00	1.20	3.20	0.90		Ø16 @14 L=6.10	Ø32 @14 L=6.10	Ø16 @15	Ø28 @20 L=2.86	Ø28 @20 L=5.45	Ø28 @20 L=7.86	Ø22 @30 L=4.23	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.52	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		11.16	1077.80
8.00	0.40	0.93	1.00	2.70	0.80		Ø16 @15 L=5.25	Ø32 @15 L=5.23	Ø16 @15	Ø22 @ 20 L= 2.13	Ø25 @ 20 L= 4.70	Ø22 @20 L=6.56	Ø18 @30 L=3.55	Ø16 @ 15 L=8.50	Ø16 @ 15 L=1.42	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		9.04	784.00
7.00	0.30	0.77	0.90	2.20	0.70		Ø14 @15 L=4.37	Ø28 @15 L=4.37	Ø14 @15	Ø22 @20 L=2.03	Ø25 @20 L=4.29	Ø22 @ 20 L=5.89	Ø16 @30 L=3.22	Ø16 @ 20 L=7.40	Ø16 @ 20 L=1.32	Ø14 @ 15	Ø14 @ 15	Ø12 @ 15		6.44	577.90
6.00	0.30	0.70	0.80	1.80	0.60		Ø14 @15 L=3.70	Ø25 @15 L=3.70	Ø14 @15	Ø18 @20 L=1.59	Ø22 @20 L=3.59	Ø18 @20 L=4.89	Ø16 @30 L=2.74	Ø16 @ 20 L=6.40	Ø16 @ 20 L=1.22	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		4.98	410.00
5.00	0.25	0.58	0.80	1.50	0.50	-	Ø14 @14 L=3.18	Ø18 @14 L=3.18	Ø14 @15	Ø16 @ 20 L=1.34	Ø18 @20 L=2.84	Ø16 @20 L=4.08	Ø16 @30 L=2.41	Ø16 @20 L=5.35	Ø16 @20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		3.53	283.40
4.00	0.25	0.52	0.60	1.20	0.50	-	Ø14 @15 L=2.62	Ø16 @15 L=2.62	Ø14 @15	Ø16 @12.5 L=1.34		Ø16 @12.5 L=3.41	Ø16 @ 25 L=2.06	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.69	225.60
3.00	0.20	0.40	0.50	1.00	0.40	-	Ø14 @15 L=2.10	Ø14 @15 L=2.10	Ø14 @15	Ø16 @15 L=1.24		Ø16 @ 15 L=2.74	Ø16 @ 30 L=1.74	Ø14 @ 20 L=3.30	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		1.66	167.20

BEARING CAPACITY =2.50 Kg/cm² (Type 1)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
12.00	0.50	1.30	2.00	4.80	1.30		Ø25 @12.5 L=9.80	Ø32 @12.5 L=9.80	Ø16 @15	Ø32 @18 L=3.77	Ø32 @18 L=7.20	Ø32 @18 L=10.37	Ø25 @27 L=5.52	Ø16 @ 15 L=12.00	Ø16 @ 15 L=2.52	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15		22.11	2085.19
11.00	0.50	1.23	2.00	4.80	1.20		Ø20 @12.5 L=9.03	Ø32 @12.5 L=9.03	Ø16 @15	Ø32 @ 20 L=3.67	Ø32 @20 L=6.79	Ø32 @20 L=9.70	Ø25 @30 L=5.19	Ø16 @ 15 L=11.60	Ø16 @ 15 L=1.82	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15		19.17	1762.55
10.00	0.40	1.07	1.60	4.40	1.10		Ø18 @12.5 L=7.97	Ø30 @12.5 L=7.97	Ø16 @15	Ø30 @20 L=3.31	Ø32 @20 L=6.38	Ø30 @20 L=8.77	Ø25 @30 L=4.86	Ø16 @ 15 L=10.50	Ø16 @ 15 L=1.72	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		15.11	1437.04
9.00	0.40	1.00	1.30	3.90	1.00		Ø16 @12.5 L=7.00	Ø28 @12.5 L=7.00	Ø16 @15	Ø28 @20 L=2.96	Ø28 @20 L=5.46	Ø28 @20 L=7.86	Ø22 @30 L=4.23	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		12.50	1113.50
8.00	0.30	0.83	1.20	3.20	1.00		Ø16 @15 L=6.03	Ø28 @15 L=6.03	Ø16 @15	Ø25 @ 20 L= 2.62	Ø25 @ 20 L= 4.72	Ø25 @20 L=6.86	Ø22 @30 L=3.89	Ø16 @ 15 L=8.40	Ø16 @ 15 L=1.62	Ø14 @ 15	Ø14 @ 15	Ø12 @ 15		9.77	842.13
7.00	0.30	0.77	1.00	2.50	0.90		Ø14 @15 L=4.97	Ø25 @15 L=4.97	Ø14 @15	Ø22 @20 L=2.23	Ø22 @20 L=4.02	Ø22 @ 20 L=5.89	Ø18 @30 L=3.22	Ø16 @ 20 L=7.40	Ø16 @ 20 L=1.52	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		7.57	554.90
6.00	0.30	0.70	0.90	2.00	0.60		Ø14 @15 L=4.10	Ø22 @15 L=4.10	Ø14 @15	Ø18 @20 L=1.69	Ø22 @20 L=3.60	Ø18 @20 L=4.89	Ø22 @30 L=3.23	Ø16 @ 20 L=6.40	Ø16 @ 20 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		4.98	406.49
5.00	0.25	0.58	0.80	1.50	0.50	-	Ø14 @14 L=3.18	Ø18 @14 L=3.18	Ø14 @15	Ø16 @ 20 L=1.34	Ø18 @20 L=2.84	Ø16 @20 L=4.08	Ø16 @30 L=2.41	Ø16 @20 L=5.35	Ø16 @20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		3.53	283.38
4.00	0.25	0.52	0.60	1.20	0.40	-	Ø14 @15 L=2.62	Ø16 @15 L=2.62	Ø14 @15	Ø16 @12.5 L=1.34		Ø16 @12.5 L=3.41	Ø16 @ 25 L=2.08	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.46	221.66
3.00	0.25	0.45	0.50	1.00	0.40	-	Ø14 @15 L=2.15	Ø14 @15 L=2.15	Ø14 @15	Ø16 @15 L=1.24		Ø16 @ 15 L=2.74	Ø16 @ 30 L=1.74	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		1.83	169.15

B E A R I N G C A P A C I T Y =2.00 Kg/cm² (Type 1)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
11.00	0.50	1.23	2.60	4.50	1.10		Ø25 @12.5 L=9.53	Ø30 @12.5 L=9.53	Ø16 @15	Ø32 @ 20 L=3.57	Ø32 @20 L=6.78	Ø32 @20 L=9.70	Ø25 @30 L=5.19	Ø16 @ 15 L=11.60	Ø16 @ 15 L=1.72	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15		19.03	1853.20
10.00	0.40	1.07	2.10	4.50	1.00		Ø22 @12.5 L=8.47	Ø30 @12.5 L=8.47	Ø16 @15	Ø30 @20 L=3.21	Ø32 @20 L=6.37	Ø30 @20 L=8.77	Ø25 @30 L=4.86	Ø16 @ 15 L=10.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		15.00	1542.40
9.00	0.40	1.00	1.80	4.00	1.00		Ø18 @12.5 L=7.60	Ø25 @12.5 L=7.60	Ø16 @15	Ø28 @20 L=2.96	Ø28 @20 L=5.46	Ø28 @20 L=7.86	Ø22 @30 L=4.23	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		13.10	1129.90
8.00	0.30	0.83	1.50	3.40	0.90		Ø16 @12.5 L=6.43	Ø25 @12.5 L=6.43	Ø16 @15	Ø25 @ 20 L= 2.52	Ø25 @ 20 L= 4.71	Ø25 @20 L=6.86	Ø22 @30 L=3.89	Ø16 @ 15 L=8.40	Ø16 @ 15 L=1.52	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		9.69	878.20
7.00	0.30	0.77	1.10	2.80	0.80		Ø16 @15 L=5.27	Ø25 @15 L=5.27	Ø16 @15	Ø22 @20 L=2.13	Ø22 @20 L=4.01	Ø22 @ 20 L=5.89	Ø18 @30 L=3.22	Ø16 @ 20 L=7.40	Ø16 @ 20 L=1.42	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		7.47	605.00
6.00	0.30	0.70	1.00	2.00	0.70		Ø14 @15 L=4.20	Ø20 @15 L=4.20	Ø14 @15	Ø18 @20 L=1.69	Ø22 @20 L=3.60	Ø18 @20 L=4.89	Ø18 @30 L=2.89	Ø16 @ 20 L=6.40	Ø16 @ 20 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		5.59	401.20
5.00	0.25	0.58	0.80	1.50	0.50	-	Ø14 @14 L=3.18	Ø18 @14 L=3.18	Ø14 @15	Ø16 @ 20 L=1.34	Ø18 @20 L=2.84	Ø16 @20 L=4.08	Ø16 @30 L=2.41	Ø16 @20 L=5.35	Ø16 @20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		5.53	263.40
4.00	0.25	0.52	0.60	1.20	0.40	-	Ø14 @15 L=2.52	Ø16 @15 L=2.52	Ø14 @15	Ø16 @12.5 L=1.24		Ø16 @12.5 L=3.41	Ø16 @ 25 L=2.08	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.46	221.70
3.00	0.25	0.45	0.50	1.00	0.40	-	Ø14 @15 L=2.15	Ø14 @15 L=2.15	Ø14 @15	Ø16 @15 L=1.24		Ø16 @ 15 L=2.74	Ø16 @ 30 L=1.74	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		1.83	169.20

BEARING CAPACITY =1.50 Kg/cm² (Type 1)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
9.00	0.30	0.90	2.50	4.10	1.00	-	Ø22 @12.5 L=8.30	Ø22 @12.5 L=8.30	Ø16 @15	Ø28 @20 L=2.96	Ø30 @20 L=5.71	Ø28 @20 L=7.86	Ø25 @30 L=4.52	Ø16 @ 15 L=9.40	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		12.90	1277.66
8.00	0.30	0.83	2.00	3.80	0.90	-	Ø18 @12.5 L=7.33	Ø22 @12.5 L=7.33	Ø16 @15	Ø25 @ 20 L= 2.52	Ø28 @ 20 L= 5.05	Ø25 @20 L=6.86	Ø22 @30 L=3.89	Ø16 @ 15 L=8.40	Ø16 @ 15 L=1.52	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		10.50	941.90
7.00	0.30	0.77	1.60	3.20	0.80	-	Ø18 @15 L=6.17	Ø22 @15 L=6.17	Ø16 @15	Ø22 @20 L=2.13	Ø25 @20 L=4.30	Ø22 @ 20 L=5.89	Ø18 @30 L=3.22	Ø16 @ 15 L=7.40	Ø16 @ 15 L=1.42	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		8.17	684.30
6.00	0.30	0.77	1.10	2.50	0.60	-	Ø16 @15 L=4.70	Ø22 @15 L=4.70	Ø16 @15	Ø18 @20 L=5.90	Ø22 @20 L=3.59	Ø18 @20 L=4.89	Ø16 @30 L=2.74	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.22	Ø12 @ 14	Ø12 @ 15	Ø12 @ 15		5.58	481.60
5.00	0.30	0.63	0.90	1.80	0.50	-	Ø14 @15 L=3.63	Ø20 @15 L=3.63	Ø14 @15	Ø16 @ 20 L=1.34	Ø18 @20 L=2.84	Ø16 @20 L=4.08	Ø16 @30 L=2.41	Ø16 @20 L=5.40	Ø16 @20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		4.00	307.10
4.00	0.25	0.52	0.60	1.30	0.40	-	Ø14 @15 L=2.62	Ø18 @15 L=2.62	Ø14 @15	Ø16 @12.5 L=1.24		Ø16 @12.5 L=3.41	Ø16 @ 25 L=2.08	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.50	232.50
3.00	0.25	0.45	0.50	1.00	0.40	-	Ø14 @15 L=2.15	Ø16 @15 L=2.15	Ø14 @15	Ø16 @15 L=1.24		Ø16 @ 15 L=2.74	Ø16 @ 30 L=1.74	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		1.33	174.50

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 1 of 1

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

From: Sta.970+475 to Sta.970+650

TOTAL WEIGHT OF STEEL PER BAR DIAMETER

STRIP NO.7/1 to 6/8

Length = 175.000 m.

S U M M A R Y

BAR SIZE (mm)	WEIGHT (kg)
8	0.000
10	0.000
12	11064.852
14	25291.807
16	20006.189
18	4037.460
20	0.000
22	24951.272
25	6306.377
28	0.000
30	0.000
32	0.000
36	0.000
TOTAL =	**91,657.96**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : TAIF AL BAHA - ABHA ROAD — Page: 1 of 1

Item : 50202 REINFORCED CONCRETE Class 280/20 — Drwg. No. _____

Retaining Wall

From: Sta.970+475 to Sta.970+650

TOTAL VOLUME OF CONCRETE PER STRIP

STRIP NO. 8/1 to 8/4

Length = 175.000 m.

S U M M A R Y

LOCATION	VOLUME (m³)
STRIP NO. 7/1	0.000
STRIP NO. 7/2	0.000
STRIP NO. 6/1	61.303
STRIP NO. 6/2	59.907
STRIP NO. 6/3	59.117
STRIP NO. 6/4	58.931
STRIP NO. 5/1	42.570
STRIP NO. 5/2	42.904
STRIP NO. 5/3	43.161
STRIP NO. 5/4	43.342
STRIP NO. 6/5	58.249
STRIP NO. 6/6	59.551
STRIP NO. 6/7	61.705
STRIP NO. 7/3	82.942
STRIP NO. 7/4	82.146
STRIP NO. 6/8	59.713
TOTAL =	**815.54**

Suprv'g. Consultant : ITAL CONSULT		TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.	
Civil Engineer	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 7 / 1 **TYPE 1**

Station:	970+450.000	Slope =	NORMAL	Station:	970+462.500
S.Level =	2152.35	B.C. =	2.50 Kg/cm²	S.Level =	2151.815
T.O.F =	2145.6			T.O.F =	2145.6
Height =	6.750	Length =	12.50	Height =	6.215
		Based Height =	6.750		
		Ave. Height =	6.483		

Retaining Wall

STRIP NO. 7 / 1

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 1

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	7.00	0.30	0.77	1.00	2.50	0.80	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 7 / 1	MK1	0.70 4.17	15	14	4.87	0.00	4.87	84	409.080	1.210	494.987
	MK2	4.17 0.70	15	25	4.87	0.00	4.87	84	409.080	3.854	1576.594
	MK3 O.L=60xØ	X = 0.70 11.30 1.94	15	14	14.64	0.00	14.64	58	849.120	1.210	1027.435
	MK4	1.83 0.40	20	22	2.23	0.00	2.23	63	140.490	2.980	418.660
	MK5	3.62 0.40	20	22	4.02	0.00	4.02	63	253.260	2.980	754.715
	MK6	5.88	20	22	5.88	0.00	5.88	63	370.440	2.980	1103.911
	MK7 Min= 2.24	0.20 Ave= 2.50 Max= 2.77	30	18	2.70	0.00	2.70	42	113.505	2.000	227.010
	MK8 Min= 6.13	0.20 93.814° Ave= 6.38 Max= 6.66	15	16	6.58	0.00	6.58	84	552.930	1.580	873.629
	MK9	1.22 93.814° 0.30	20	16	1.52	0.00	1.52	63	95.760	1.580	151.301
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	30	400.200	1.210	484.242
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	30	396.600	0.888	352.181
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12var.	Min= 1.93 Ave= 5.44 Max= 8.94	15	12	5.44	0.00	5.44	6	32.638	0.888	28.982
										SUB TOTAL =	**7,798.871**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 1

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	7.000	0.300	0.770	1.000	2.500	0.800	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 7 / 1	MK12edge O.L=60xØ	12 / 1.13	15	12	13.13	0.00	13.13	2	26.263	0.888	23.321
										SUB TOTAL =	**23.321**
										TOTAL =	**7,822.192**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	709.708
14	2006.664
16	1024.930
18	227.010
20	
22	2277.286
25	1576.594
28	
30	
32	
36	
TOTAL =	

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 1 **TYPE 1**

Station:	970+450.000	Slope =	NORMAL	Station:	970+462.500
S.Level =	2152.35	B.C. =	2.50 Kg/cm²	S.Level =	2151.815
T.O.F. =	2145.6	Ave. Height =	6.48	T.O.F. =	2145.6
Height =	6.75	Based Height =	6.75	Height =	6.215

Quantity of Concrete			
	Area	Legth	Volume
Wall	3.468	12.450	43.178
Found'n	3.416	12.450	42.529
Key			
		Total Volume =	

Retaining Wall

STRIP NO. 7 / 1

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 2 **TYPE 1**

Station:	970+462.500	Slope =	NORMAL	Station:	970+475.000
S.Level =	2151.815	B.C. =	2.50 Kg/cm²	S.Level =	2151.28
T.O.F =	2145.6			T.O.F =	2145.6
Height =	6.215	Length =	12.50	Height =	5.680
		Based Height =	6.215		
		Ave. Height =	5.948		

Retaining Wall

STRIP NO. 7 / 2

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 2

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	7.00	0.30	0.77	1.00	2.50	0.80	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 7 / 2	MK1	0.70 4.17	15	14	4.87	0.00	4.87	84	409.080	1.210	494.987
	MK2	4.17 0.70	15	25	4.87	0.00	4.87	84	409.080	3.854	1576.594
	MK3 O.L=60xØ	X = 0.70 11.30 1.94	15	14	14.64	0.00	14.64	58	849.120	1.210	1027.435
	MK4	1.83 0.40	20	22	2.23	0.00	2.23	63	140.490	2.980	418.660
	MK5	3.62 0.40	20	22	4.02	0.00	4.02	63	253.260	2.980	754.715
	MK6	5.88	20	22	5.88	0.00	5.88	63	370.440	2.980	1103.911
	MK7 Min= 1.70	0.20 Ave= 1.97 Max= 2.24	30	18	2.17	0.00	2.17	42	91.035	2.000	182.070
	MK8 Min= 5.59	0.20 93.814° Ave= 5.85 Max= 6.13	15	16	6.05	0.00	6.05	84	507.990	1.580	802.624
	MK9	1.22 93.814° 0.30	20	16	1.52	0.00	1.52	63	95.760	1.580	151.301
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	28	373.520	1.210	451.959
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 1.93 Ave= 5.44 Max= 8.94	15	12	5.44	0.00	5.44	6	32.638	0.888	28.982
										SUB TOTAL =	**7,603.686**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Retaining Wall

Page: 3 of 4

Drwg. No. _____

STRIP NO. 7 / 2

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	7.000	0.300	0.770	1.000	2.500	0.800	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 7 / 2	MK12edge O.L=60xØ	12 1.13	15	12	13.13	0.00	13.13	2	26.263	0.888	23.321
										SUB TOTAL =	**23.321**
										TOTAL =	**7,627.007**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	662.750
14	1974.381
16	953.925
18	182.070
20	
22	2277.286
25	1576.594
28	
30	
32	
36	
TOTAL =	

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 2 **TYPE 1**

Station:	970+462.500	Slope =	NORMAL	Station:	970+475.000
S.Level =	2151.815	B.C. =	2.50 Kg/cm²	S.Level =	2151.28
T.O.F. =	2145.6	Ave. Height =	5.95	T.O.F. =	2145.6
Height =	6.215	Based Height =	6.22	Height =	5.68

Quantity of Concrete			
	Area	Legth	Volume
Wall	3.182	12.400	39.456
Found'n	3.416	12.400	42.358
Key			
		Total Volume =	

Retaining Wall

STRIP NO. 7 / 2

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 1 **TYPE 1**

Station:	970+475.000	Slope =	NORMAL	Station:	970+487.500
S.Level =	2151.28	B.C. =	2.50 Kg/cm²	S.Level =	2151.055
T.O.F =	2145.6			T.O.F =	2145.6
Height =	5.680	Length =	12.50	Height =	5.455
		Based Height =	5.680		
		Ave. Height =	5.568		

Retaining Wall

STRIP NO. 6 / 1

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 1

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.00	0.30	0.70	0.90	2.00	0.60	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 1	MK1	0.50 3.50	15	14	4.00	0.00	4.00	84	336.000	1.210	406.560
	MK2	3.50 0.50	15	22	4.00	0.00	4.00	84	336.000	2.980	1001.280
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	48	683.520	1.210	827.059
	MK4	1.48 0.33	20	18	1.80	0.00	1.80	63	113.400	2.000	226.800
	MK5	3.10 0.40	20	22	3.50	0.00	3.50	63	220.500	2.980	657.090
	MK6	4.59	20	16	4.59	0.00	4.59	63	289.170	1.580	456.889
	MK7 Min= 2.50	0.20 Ave= 2.62 Max= 2.73	30	22	2.82	0.00	2.82	42	118.335	2.980	352.638
	MK8 Min= 5.37	0.20 93.814° Ave= 5.47 Max= 5.59	20	16	5.67	0.00	5.67	63	357.053	1.580	564.143
	MK9	1.02 93.814° 0.30	20	16	1.32	0.00	1.32	63	83.160	1.580	131.393
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	26	346.840	1.210	419.676
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 0.00 Ave= 4.12 Max= 4.12	15	12	4.12	0.00	4.12	2	8.232	0.888	7.310
										SUB TOTAL =	**5,637.807**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 1

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.000	0.300	0.700	0.900	2.000	0.600	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 1	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.244	0.888	23.305
										SUB TOTAL =	23.305
										TOTAL =	5,661.111

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	617.583
14	1653.296
16	1152.424
18	226.800
20	
22	2011.008
25	
28	
30	
32	
36	
TOTAL =	5,661.111

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 1 **TYPE 1**

Station:	970+475.000	Slope =	NORMAL	Station:	970+487.500
S.Level =	2151.28	B.C. =	2.50 Kg/cm²	S.Level =	2151.055
T.O.F. =	2145.6	Ave. Height =	5.57	T.O.F. =	2145.6
Height =	5.68	Based Height =	5.68	Height =	5.455

Quantity of Concrete			
	Area	Legth	Volume
Wall	2.784	12.400	34.519
Found'n	2.160	12.400	26.784
Key			
		Total Volume =	**61.303**

Retaining Wall

STRIP NO. 6 / 1

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 6 / 2

TYPE 1

Station: 970+487.500	Slope = NORMAL	Station: 970+500.000
S.Level = 2151.055	B.C. = 2.50 Kg/cm²	S.Level = 2150.83
T.O.F = 2145.6		T.O.F = 2145.6
Height = 5.455	Length = 12.50	Height = 5.230
	Based Height = 5.455	
	Ave. Height = 5.342	

Retaining Wall

STRIP NO. 6 / 2

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 2

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.00	0.30	0.70	0.90	2.00	0.60	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 2	MK1	0.50 3.50	15	14	4.00	0.00	4.00	84	336.000	1.210	406.560
	MK2	3.50 0.50	15	22	4.00	0.00	4.00	84	336.000	2.980	1001.280
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	48	683.520	1.210	827.059
	MK4	1.48 0.33	20	18	1.80	0.00	1.80	63	113.400	2.000	226.800
	MK5	3.10 0.40	20	22	3.50	0.00	3.50	63	220.500	2.980	657.090
	MK6	4.59	20	16	4.59	0.00	4.59	63	289.170	1.580	456.889
	MK7 Min= 2.28	0.20 Ave= 2.39 Max= 2.50	30	22	2.59	0.00	2.59	42	108.885	2.980	324.477
	MK8 Min= 5.14	0.20 93.814° Ave= 5.24 Max= 5.37	20	16	5.44	0.00	5.44	63	342.877	1.580	541.746
	MK9	1.02 93.814° 0.30	20	16	1.32	0.00	1.32	63	83.160	1.580	131.393
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	26	346.840	1.210	419.676
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 0.00 Ave= 4.12 Max= 4.12	15	12	4.12	0.00	4.12	2	8.232	0.888	7.310
										SUB TOTAL =	**5,587.249**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 2

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.000	0.300	0.700	0.900	2.000	0.600	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 2	MK12edge O.L=60xØ	12 1.12	15	12	13.12	0.00	13.12	2	26.244	0.888	23.305
		X = 0.30									
										SUB TOTAL =	**23.305**
										TOTAL =	**5,610.554**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	617.583
14	1653.296
16	1130.028
18	226.800
20	
22	1982.847
25	
28	
30	
32	
36	
TOTAL =	**5,610.554**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 2 **TYPE 1**

Station: 970+487.500	Slope = NORMAL	Station: 970+500.000
S.Level = 2151.055	B.C. = 2.50 Kg/cm²	S.Level = 2150.83
T.O.F. = 2145.6	Ave. Height = 5.34	T.O.F. = 2145.6
Height = 5.455	Based Height = 5.45	Height = 5.23

Quantity of Concrete

	Area	Legth	Volume
Wall	2.671	12.400	33.123
Found'n	2.160	12.400	26.784
Key			
		Total Volume =	**59.907**

Retaining Wall

STRIP NO. 6 / 2

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 6 / 3 **TYPE 1**

Station:	970+500.000	Slope =	NORMAL	Station:	970+512.500
S.Level =	2150.83	B.C. =	2.50 Kg/cm²	S.Level =	2150.8
T.O.F =	2145.6			T.O.F =	2145.6
Height =	5.230	Length =	12.50	Height =	5.200
		Based Height =	5.230		
		Ave. Height =	5.215		

Retaining Wall

STRIP NO. 6 / 3

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 3

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.00	0.30	0.70	0.90	2.00	0.60	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 3	MK1	0.50 3.50	15	14	4.00	0.00	4.00	84	336.000	1.210	406.560
	MK2	3.50 0.50	15	22	4.00	0.00	4.00	84	336.000	2.980	1001.280
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	48	683.520	1.210	827.059
	MK4	1.48 0.33	20	18	1.80	0.00	1.80	63	113.400	2.000	226.800
	MK5	3.10 0.40	20	22	3.50	0.00	3.50	63	220.500	2.980	657.090
	MK6	4.59	20	16	4.59	0.00	4.59	63	289.170	1.580	456.889
	MK7 Min= 2.25	0.20 Ave= 2.27 Max= 2.28	30	22	2.47	0.00	2.47	42	103.530	2.980	308.519
	MK8 Min= 5.11	0.20 93.814° Ave= 5.12 Max= 5.14	20	16	5.32	0.00	5.32	63	334.845	1.580	529.055
	MK9	1.02 93.814° 0.30	20	16	1.32	0.00	1.32	63	83.160	1.580	131.393
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	26	346.840	1.210	419.676
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 0.00 Ave= 0.00 Max= 0.00	15	12	0.00	0.00	0.00	0	0.000	0.888	0.000
										SUB TOTAL =	**5,551.290**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 3

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.000	0.300	0.700	0.900	2.000	0.600	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 3	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.240	0.888	23.301
										SUB TOTAL =	**23.301**
										TOTAL =	**5,574.591**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	610.269
14	1653.296
16	1117.337
18	226.800
20	
22	1966.889
25	
28	
30	
32	
36	
TOTAL =	**5,574.591**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. **6 / 3** **TYPE 1**

Station:	970+500.000	Slope =	NORMAL	Station:	970+512.500
S.Level =	2150.83	B.C. =	2.50 Kg/cm²	S.Level =	2150.8
T.O.F. =	2145.6	Ave. Height =	5.22	T.O.F. =	2145.6
Height =	5.23	Based Height =	5.23	Height =	5.2

Quantity of Concrete			
	Area	Legth	Volume
Wall	2.608	12.400	32.333
Found'n	2.160	12.400	26.784
Key			
		Total Volume =	**59.117**

Retaining Wall

STRIP NO. 6 / 3

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 6 / 4

TYPE 1

Station:	970+512.500	Slope =	NORMAL	Station:	970+525.000
S.Level =	2150.8	B.C. =	2.50 Kg/cm²	S.Level =	2150.77
T.O.F =	2145.6			T.O.F =	2145.6
Height =	5.200	Length =	12.50	Height =	5.170
		Based Height =	5.200		
		Ave. Height =	5.185		

Retaining Wall

STRIP NO. 6 / 4

Suprv'g. Consultant : ITAL CONSULT		TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.	
Civil Engineer	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 4

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.00	0.30	0.70	0.90	2.00	0.60	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 4	MK1	0.50 3.50	15	14	4.00	0.00	4.00	84	336.000	1.210	406.560
	MK2	3.50 0.50	15	22	4.00	0.00	4.00	84	336.000	2.980	1001.280
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	48	683.520	1.210	827.059
	MK4	1.48 0.33	20	18	1.80	0.00	1.80	63	113.400	2.000	226.800
	MK5	3.10 0.40	20	22	3.50	0.00	3.50	63	220.500	2.980	657.090
	MK6	4.59	20	16	4.59	0.00	4.59	63	289.170	1.580	456.889
	MK7 Min= 2.22	0.20 Ave= 2.24 Max= 2.25	30	22	2.44	0.00	2.44	42	102.270	2.980	304.765
	MK8 Min= 5.08	0.20 93.814° Ave= 5.09 Max= 5.11	20	16	5.29	0.00	5.29	63	332.955	1.580	526.069
	MK9	1.02 93.814° 0.30	20	16	1.32	0.00	1.32	63	83.160	1.580	131.393
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	26	346.840	1.210	419.676
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 0.00 Ave= 0.00 Max= 0.00	15	12	0.00	0.00	0.00	0	0.000	0.888	0.000
										SUB TOTAL =	**5,544.549**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Retaining Wall

Page: 3 of 4

Drwg. No. _____

STRIP NO. 6 / 4

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.000	0.300	0.700	0.900	2.000	0.600	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 4	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.240	0.888	23.301
										SUB TOTAL =	**23.301**
										TOTAL =	**5,567.850**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	610.269
14	1653.296
16	1114.350
18	226.800
20	
22	1963.135
25	
28	
30	
32	
36	
TOTAL =	**5,567.850**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 4 **TYPE 1**

Station:	970+512.500	Slope =	NORMAL	Station:	970+525.000
S.Level =	2150.8	B.C. =	2.50 Kg/cm²	S.Level =	2150.77
T.O.F. =	2145.6	Ave. Height =	5.19	T.O.F. =	2145.6
Height =	5.2	Based Height =	5.20	Height =	5.17

Quantity of Concrete

	Area	Legth	Volume
Wall	2.593	12.400	32.147
Found'n	2.160	12.400	26.784
Key			
		Total Volume =	**58.931**

Retaining Wall

STRIP NO. 6 / 4

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 5 / 1

TYPE 1

Station: 970+525.000	Slope = NORMAL	Station: 970+537.500
S.Level = 2150.77	B.C. = 2.50 Kg/cm²	S.Level = 2150.835
T.O.F = 2146		T.O.F = 2146
Height = 4.770	Length = 12.50	Height = 4.835
	Based Height = 4.835	
	Ave. Height = 4.803	

Retaining Wall

STRIP NO. 5 / 1

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 1

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.00	0.25	0.58	0.80	1.50	0.50	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 5 / 1	MK1	0.40 2.78	14	14	3.18	0.00	3.18	90	286.200	1.210	346.302
	MK2	2.78 0.40	14	16	3.18	0.00	3.18	90	286.200	1.580	452.196
	MK3 O.L=60xØ	X = 0.40 11.60 1.64	15	14	14.04	0.00	14.04	40	561.600	1.210	679.536
	MK4	1.24 0.30	20	16	1.54	0.00	1.54	63	97.020	1.580	153.292
	MK5	2.52 0.33	20	18	2.84	0.00	2.84	63	178.920	2.000	357.840
	MK6	4.08	20	16	4.08	0.00	4.08	63	257.040	1.580	406.123
	MK7 Min= 2.03	0.15 Ave= 2.06 Max= 2.10	30	16	2.21	0.00	2.21	42	92.925	1.580	146.822
	MK8 Min= 4.75	0.15 93.814° Ave= 4.70 Max= 4.68	20	16	4.85	0.00	4.85	63	305.708	1.580	483.018
	MK9	0.82 93.814° 0.30	20	16	1.12	0.00	1.12	63	70.560	1.580	111.485
	MK10 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	22	290.840	0.888	258.266
	MK12var.	Min= 0.00 Ave= 0.00 Max= 0.00	15	12	0.00	0.00	0.00	0	0.000	0.888	0.000
										SUB TOTAL =	**3,958.368**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 1

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.000	0.250	0.580	0.800	1.500	0.500	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 5 / 1	MK12edge O.L=60xØ	12 1.12	15	12	13.12	0.00	13.12	2	26.240	0.888	23.301
										SUB TOTAL =	**23.301**
										TOTAL =	**3,981.670**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	845.057
14	1025.838
16	1752.935
18	357.840
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**3,981.670**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 1 **TYPE 1**

Station:	970+525.000	Slope =	NORMAL	Station:	970+537.500
S.Level =	2150.77	B.C. =	2.50 Kg/cm²	S.Level =	2150.835
T.O.F. =	2146	Ave. Height =	4.80	T.O.F. =	2146
Height =	4.77	Based Height =	4.84	Height =	4.835

Quantity of Concrete			
	Area	Legth	Volume
Wall	1.993	12.400	24.714
Found'n	1.440	12.400	17.856
Key			
		Total Volume =	**42.570**

Retaining Wall
STRIP NO. 5 / 1

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 5 / 2

TYPE 1

Station: 970+537.500	Slope = NORMAL	Station: 970+550.000
S.Level = 2150.835	B.C. = 2.50 Kg/cm²	S.Level = 2150.9
T.O.F = 2146		T.O.F = 2146
Height = 4.835	Length = 12.50	Height = 4.900
	Based Height = 4.900	
	Ave. Height = 4.868	

Retaining Wall

STRIP NO. 5 / 2

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 2

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.00	0.25	0.58	0.80	1.50	0.50	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 5 / 2	MK1	0.40 2.78	14	14	3.18	0.00	3.18	90	286.200	1.210	346.302
	MK2	2.78 0.40	14	16	3.18	0.00	3.18	90	286.200	1.580	452.196
	MK3 O.L=60xØ	X = 0.40 11.60 1.64	15	14	14.04	0.00	14.04	40	561.600	1.210	679.536
	MK4	1.24 0.30	20	16	1.54	0.00	1.54	63	97.020	1.580	153.292
	MK5	2.52 0.33	20	18	2.84	0.00	2.84	63	178.920	2.000	357.840
	MK6	4.08	20	16	4.08	0.00	4.08	63	257.040	1.580	406.123
	MK7 Min= 2.10	0.15 Ave= 2.13 Max= 2.16	30	16	2.28	0.00	2.28	42	95.655	1.580	151.135
	MK8 Min= 4.81	0.15 93.814° Ave= 4.77 Max= 4.75	20	16	4.92	0.00	4.92	63	309.803	1.580	489.488
	MK9	0.82 93.814° 0.30	20	16	1.12	0.00	1.12	63	70.560	1.580	111.485
	MK10 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	22	290.840	0.888	258.266
	MK12var.	Min= 0.00 Ave= 0.00 Max= 0.00	15	12	0.00	0.00	0.00	0	0.000	0.888	0.000
										SUB TOTAL =	**3,969.152**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 2

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.000	0.250	0.580	0.800	1.500	0.500	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 5 / 2	MK12edge O.L=60xØ	12 1.12	15	12	13.12	0.00	13.12	2	26.240	0.888	23.301
										SUB TOTAL =	**23.301**
										TOTAL =	**3,992.453**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	845.057
14	1025.838
16	1763.718
18	357.840
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**3,992.453**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 2 **TYPE 1**

Station: 970+537.500	Slope = NORMAL	Station: 970+550.000
S.Level = 2150.835	B.C. = 2.50 Kg/cm²	S.Level = 2150.9
T.O.F. = 2146	Ave. Height = 4.87	T.O.F. = 2146
Height = 4.835	Based Height = 4.90	Height = 4.9

Quantity of Concrete			
	Area	Legth	Volume
Wall	2.020	12.400	25.048
Found'n	1.440	12.400	17.856
Key			
		Total Volume =	**42.904**

Retaining Wall

STRIP NO. 5 / 2

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 5 / 3

TYPE 1

Station: 970+550.000	Slope = NORMAL	Station: 970+562.500
S.Level = 2150.9	B.C. = 2.50 Kg/cm²	S.Level = 2150.935
T.O.F = 2146		T.O.F = 2146
Height = 4.900	Length = 12.50	Height = 4.935
	Based Height = 4.935	
	Ave. Height = 4.918	

Retaining Wall

STRIP NO. 5 / 3

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 3

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.00	0.25	0.58	0.80	1.50	0.50	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 5 / 3	MK1	0.40 2.78	14	14	3.18	0.00	3.18	90	286.200	1.210	346.302
	MK2	2.78 0.40	14	16	3.18	0.00	3.18	90	286.200	1.580	452.196
	MK3 O.L=60xØ	X = 0.40 11.60 1.64	15	14	14.04	0.00	14.04	40	561.600	1.210	679.536
	MK4	1.24 0.30	20	16	1.54	0.00	1.54	63	97.020	1.580	153.292
	MK5	2.52 0.33	20	18	2.84	0.00	2.84	63	178.920	2.000	357.840
	MK6	4.08	20	16	4.08	0.00	4.08	63	257.040	1.580	406.123
	MK7 Min= 2.16	0.15 Ave= 2.18 Max= 2.19	30	16	2.33	0.00	2.33	42	97.755	1.580	154.453
	MK8 Min= 4.85	0.15 93.814° Ave= 4.82 Max= 4.81	20	16	4.97	0.00	4.97	63	312.953	1.580	494.465
	MK9	0.82 93.814° 0.30	20	16	1.12	0.00	1.12	63	70.560	1.580	111.485
	MK10 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	22	290.840	0.888	258.266
	MK12var.	Min= 0.00 Ave= 0.00 Max= 0.00	15	12	0.00	0.00	0.00	0	0.000	0.888	0.000
										SUB TOTAL =	**3,977.447**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 3

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.000	0.250	0.580	0.800	1.500	0.500	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 5 / 3	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.240	0.888	23.301
										SUB TOTAL =	**23.301**
										TOTAL =	**4,000.748**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	845.056
14	1025.838
16	1772.013
18	357.840
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**4,000.748**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 3 **TYPE 1**

Station:	970+550.000	Slope =	NORMAL	Station:	970+562.500
S.Level =	2150.9	B.C. =	2.50 Kg/cm²	S.Level =	2150.935
T.O.F. =	2146	Ave. Height =	4.92	T.O.F. =	2146
Height =	4.9	Based Height =	4.93	Height =	4.935

Quantity of Concrete

	Area	Legth	Volume
Wall	2.041	12.400	25.305
Found'n	1.440	12.400	17.856
Key			
		Total Volume =	**43.161**

Retaining Wall

STRIP NO. 5 / 3

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 5 / 4

TYPE 1

Station:	970+562.500	Slope =	NORMAL	Station:	970+575.000
S.Level =	2150.935	B.C. =	2.50 Kg/cm²	S.Level =	2150.97
T.O.F =	2146			T.O.F =	2146
Height =	4.935	Length =	12.50	Height =	4.970
		Based Height =	4.970		
		Ave. Height =	4.952		

Retaining Wall

STRIP NO. 5 / 4

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 4

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.00	0.25	0.58	0.80	1.50	0.50	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 5 / 4	MK1	0.40 2.78	14	14	3.18	0.00	3.18	90	286.200	1.210	346.302
	MK2	2.78 0.40	14	16	3.18	0.00	3.18	90	286.200	1.580	452.196
	MK3 O.L=60xØ	X = 0.40 11.60 1.64	15	14	14.04	0.00	14.04	40	561.600	1.210	679.536
	MK4	1.24 0.30	20	16	1.54	0.00	1.54	63	97.020	1.580	153.292
	MK5	2.52 0.33	20	18	2.84	0.00	2.84	63	178.920	2.000	357.840
	MK6	4.08	20	16	4.08	0.00	4.08	63	257.040	1.580	406.123
	MK7 Min= 2.19	0.15 Ave= 2.21 Max= 2.23	30	16	2.36	0.00	2.36	42	99.225	1.580	156.775
	MK8 Min= 4.88	0.15 93.814° Ave= 4.85 Max= 4.85	20	16	5.00	0.00	5.00	63	315.157	1.580	497.949
	MK9	0.82 93.814° 0.30	20	16	1.12	0.00	1.12	63	70.560	1.580	111.485
	MK10 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 0.00 Ave= 0.00 Max= 0.00	15	12	0.00	0.00	0.00	0	0.000	0.888	0.000
										SUB TOTAL =	**4,006.732**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Retaining Wall

Page: 3 of 4

Drwg. No. _____

STRIP NO. 5 / 4

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.000	0.250	0.580	0.800	1.500	0.500	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 5 / 4	MK12edge O.L=60xØ	12 1.12	15	12	13.12	0.00	13.12	2	26.240	0.888	23.301
										SUB TOTAL =	**23.301**
										TOTAL =	**4,030.033**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	868.535
14	1025.838
16	1777.820
18	357.840
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**4,030.033**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 5 / 4 **TYPE 1**

Station: 970+562.500	Slope = NORMAL	Station: 970+575.000
S.Level = 2150.935	B.C. = 2.50 Kg/cm²	S.Level = 2150.97
T.O.F. = 2146	Ave. Height = 4.95	T.O.F. = 2146
Height = 4.935	Based Height = 4.97	Height = 4.97

Quantity of Concrete			
	Area	Legth	Volume
Wall	2.055	12.400	25.486
Found'n	1.440	12.400	17.856
Key			
		Total Volume =	**43.342**

Retaining Wall

STRIP NO. 5 / 4

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 6 / 5

TYPE 1

Station: 970+575.000	Slope = NORMAL	Station: 970+587.500
S.Level = 2150.97	B.C. = 2.50 Kg/cm²	S.Level = 2151.18
T.O.F = 2146		T.O.F = 2146
Height = 4.970	Length = 12.50	Height = 5.180
	Based Height = 5.180	
	Ave. Height = 5.075	

Retaining Wall

STRIP NO. 6 / 5

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 5

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.00	0.30	0.70	0.90	2.00	0.60	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 5	MK1	0.50 3.50	15	14	4.00	0.00	4.00	84	336.000	1.210	406.560
	MK2	3.50 0.50	15	22	4.00	0.00	4.00	84	336.000	2.980	1001.280
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	48	683.520	1.210	827.059
	MK4	1.48 0.33	20	18	1.80	0.00	1.80	63	113.400	2.000	226.800
	MK5	3.10 0.40	20	22	3.50	0.00	3.50	63	220.500	2.980	657.090
	MK6	4.59	20	16	4.59	0.00	4.59	63	289.170	1.580	456.889
	MK7	0.20 Ave= 2.12 Min= 2.02 Max= 2.23	30	22	2.32	0.00	2.32	42	97.650	2.980	290.997
	MK8	0.20 93.814° Ave= 4.97 Min= 5.09 Max= 4.88	20	16	5.17	0.00	5.17	63	326.025	1.580	515.119
	MK9	1.02 93.814° 0.30	20	16	1.32	0.00	1.32	63	83.160	1.580	131.393
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	24	320.160	1.210	387.394
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	22	290.840	0.888	258.266
	MK12var.	Min= 0.00 Ave= 3.52 Max= 3.52	15	12	3.52	0.00	3.52	2	7.042	0.888	6.253
										SUB TOTAL =	**5,446.845**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Retaining Wall

Page: 3 of 4

Drwg. No. _____

STRIP NO. 6 / 5

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.000	0.300	0.700	0.900	2.000	0.600	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 5	MK12edge O.L=60xØ	12 1.12	15	12	13.12	0.00	13.12	2	26.243	0.888	23.304
										SUB TOTAL =	**23.304**
										TOTAL =	**5,470.149**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	569.568
14	1621.013
16	1103.401
18	226.800
20	
22	1949.367
25	
28	
30	
32	
36	
TOTAL =	**5,470.149**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : TAIF AL BAHA - ABHA ROAD — Page: 4 of 4

Item : 50202 REINFORCED CONCRETE Class 280/20 — Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 5 — **TYPE 1**

Station:	970+575.000	Slope =	NORMAL	Station:	970+587.500
S.Level =	2150.97	B.C. =	2.50 Kg/cm²	S.Level =	2151.18
T.O.F. =	2146	Ave. Height =	5.07	T.O.F. =	2146
Height =	4.97	Based Height =	5.18	Height =	5.18

Quantity of Concrete

	Area	Legth	Volume
Wall	2.537	12.400	31.465
Found'n	2.160	12.400	26.784
Key			
		Total Volume =	**58.249**

Retaining Wall

STRIP NO. 6 / 5

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 6 / 6

TYPE 1

Station:	970+587.500	Slope =	NORMAL	Station:	970+600.000
S.Level =	2151.18	B.C. =	2.50 Kg/cm²	S.Level =	2151.39
T.O.F =	2146			T.O.F =	2146
Height =	5.180	Length =	12.50	Height =	5.390
		Based Height =	5.390		
		Ave. Height =	5.285		

Retaining Wall

STRIP NO. 6 / 6

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 6

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.00	0.30	0.70	0.90	2.00	0.60	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 6	MK1	0.50 3.50	15	14	4.00	0.00	4.00	84	336.000	1.210	406.560
	MK2	3.50 0.50	15	22	4.00	0.00	4.00	84	336.000	2.980	1001.280
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	48	683.520	1.210	827.059
	MK4	1.48 0.33	20	18	1.80	0.00	1.80	63	113.400	2.000	226.800
	MK5	3.10 0.40	20	22	3.50	0.00	3.50	63	220.500	2.980	657.090
	MK6	4.59	20	16	4.59	0.00	4.59	63	289.170	1.580	456.889
	MK7 Min= 2.23	0.20 Ave= 2.33 Max= 2.44	30	22	2.53	0.00	2.53	42	106.470	2.980	317.281
	MK8 Min= 5.30	0.20 93.814° Ave= 5.18 Max= 5.09	20	16	5.38	0.00	5.38	63	339.255	1.580	536.023
	MK9	1.02 93.814° 0.30	20	16	1.32	0.00	1.32	63	83.160	1.580	131.393
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	26	346.840	1.210	419.676
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 0.00 Ave= 3.52 Max= 3.52	15	12	3.52	0.00	3.52	2	7.042	0.888	6.253
										SUB TOTAL =	**5,573.272**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 6

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.000	0.300	0.700	0.900	2.000	0.600	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 6	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.243	0.888	23.304
										SUB TOTAL =	**23.304**
										TOTAL =	**5,596.576**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	616.526
14	1653.296
16	1124.304
18	226.800
20	
22	1975.651
25	
28	
30	
32	
36	
TOTAL =	**5,596.576**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. **6 / 6** **TYPE 1**

Station:	970+587.500	Slope =	NORMAL	Station:	970+600.000
S.Level =	2151.18	B.C. =	2.50 Kg/cm²	S.Level =	2151.39
T.O.F. =	2146	Ave. Height =	5.28	T.O.F. =	2146
Height =	5.18	Based Height =	5.39	Height =	5.39

Quantity of Concrete

	Area	Legth	Volume
Wall	2.642	12.400	32.767
Found'n	2.160	12.400	26.784
Key			
		Total Volume =	**59.551**

Retaining Wall

STRIP NO. 6 / 6

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 7 **TYPE 1**

Station:	970+600.000	Slope =	NORMAL	Station:	970+612.500
S.Level =	2151.39	B.C. =	2.50 Kg/cm²	S.Level =	2151.875
T.O.F =	2146			T.O.F =	2146
Height =	5.390	Length =	12.50	Height =	5.875
		Based Height =	5.875		
		Ave. Height =	5.632		

Retaining Wall

STRIP NO. 6 / 7

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 2 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 7

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.00	0.30	0.70	0.90	2.00	0.60	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 7	MK1	0.50 3.50	15	14	4.00	0.00	4.00	84	336.000	1.210	406.560
	MK2	3.50 0.50	15	22	4.00	0.00	4.00	84	336.000	2.980	1001.280
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	48	683.520	1.210	827.059
	MK4	1.48 0.33	20	18	1.80	0.00	1.80	63	113.400	2.000	226.800
	MK5	3.10 0.40	20	22	3.50	0.00	3.50	63	220.500	2.980	657.090
	MK6	4.59	20	16	4.59	0.00	4.59	63	289.170	1.580	456.889
	MK7 Min= 2.44	0.20 Ave= 2.68 Max= 2.93	30	22	2.88	0.00	2.88	42	121.065	2.980	360.774
	MK8 Min= 5.79	0.20 93.814° Ave= 5.53 Max= 5.30	20	16	5.73	0.00	5.73	63	361.147	1.580	570.613
	MK9	1.02 93.814° 0.30	20	16	1.32	0.00	1.32	63	83.160	1.580	131.393
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	28	373.520	1.210	451.959
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 0.85 Ave= 4.72 Max= 8.58	15	12	4.72	0.00	4.72	6	28.302	0.888	25.133
										SUB TOTAL =	**5,725.996**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 7

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.000	0.300	0.700	0.900	2.000	0.600	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 7	MK12edge O.L=60xØ	12 / 1.13	15	12	13.13	0.00	13.13	2	26.259	0.888	23.318
										SUB TOTAL =	**23.318**
										TOTAL =	**5,749.314**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	658.897
14	1685.578
16	1158.894
18	226.800
20	
22	2019.144
25	
28	
30	
32	
36	
TOTAL =	**5,749.314**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 7 **TYPE 1**

Station: 970+600.000	Slope = NORMAL	Station: 970+612.500
S.Level = 2151.39	B.C. = 2.50 Kg/cm²	S.Level = 2151.875
T.O.F. = 2146	Ave. Height = 5.63	T.O.F. = 2146
Height = 5.39	Based Height = 5.88	Height = 5.875

Quantity of Concrete

	Area	Legth	Volume
Wall	2.816	12.400	34.921
Found'n	2.160	12.400	26.784
Key			
		Total Volume =	**61.705**

Retaining Wall
STRIP NO. 6 / 7

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 3 **TYPE 1**

Station:	970+612.500	Slope =	NORMAL	Station:	970+625.000
S.Level =	2151.875	B.C. =	2.50 Kg/cm²	S.Level =	2152.36
T.O.F =	2146			T.O.F =	2146
Height =	5.875	Length =	12.50	Height =	6.360
		Based Height =	6.360		
		Ave. Height =	6.118		

Retaining Wall

STRIP NO. 7 / 3

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 2 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 3

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	7.00	0.30	0.77	1.00	2.50	0.80	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 7 / 3	MK1	0.70 4.17	15	14	4.87	0.00	4.87	84	409.080	1.210	494.987
	MK2	4.17 0.70	15	25	4.87	0.00	4.87	84	409.080	3.854	1576.594
	MK3 O.L=60xØ	X = 0.70 11.30 1.94	15	14	14.64	0.00	14.64	58	849.120	1.210	1027.435
	MK4	1.83 0.40	20	22	2.23	0.00	2.23	63	140.490	2.980	418.660
	MK5	3.62 0.40	20	22	4.02	0.00	4.02	63	253.260	2.980	754.715
	MK6	5.88	20	22	5.88	0.00	5.88	63	370.440	2.980	1103.911
	MK7 Min= 1.90	0.20 Ave= 2.14 Max= 2.38	30	18	2.34	0.00	2.34	42	98.175	2.000	196.350
	MK8 Min= 6.27	0.20 93.814° Ave= 6.02 Max= 5.79	15	16	6.22	0.00	6.22	84	522.270	1.580	825.187
	MK9	1.22 93.814° 0.30	20	16	1.52	0.00	1.52	63	95.760	1.580	151.301
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	30	400.200	1.210	484.242
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	30	396.600	0.888	352.181
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12var.	Min= 0.85 Ave= 4.72 Max= 8.58	15	12	4.72	0.00	4.72	6	28.302	0.888	25.133
										SUB TOTAL =	**7,715.919**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Retaining Wall

Page: 3 of 4

Drwg. No. _____

STRIP NO. 7 / 3

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	7.000	0.300	0.770	1.000	2.500	0.800	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 7 / 3	MK12edge O.L=60xØ	12 1.13	15	12	13.13	0.00	13.13	2	26.259	0.888	23.318
										SUB TOTAL =	**23.318**
										TOTAL =	**7,739.236**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	705.854
14	2006.664
16	976.487
18	196.350
20	
22	2277.286
25	1576.594
28	
30	
32	
36	
TOTAL =	**7,739.236**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 3 **TYPE 1**

Station:	970+612.500	Slope =	NORMAL	Station:	970+625.000
S.Level =	2151.875	B.C. =	2.50 Kg/cm²	S.Level =	2152.36
T.O.F. =	2146	Ave. Height =	6.12	T.O.F. =	2146
Height =	5.875	Based Height =	6.36	Height =	6.36

Quantity of Concrete			
	Area	Legth	Volume
Wall	3.273	12.400	40.583
Found'n	3.416	12.400	42.358
Key			
		Total Volume =	**82.942**

Retaining Wall

STRIP NO. 7 / 3

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 4 **TYPE 1**

Station:	970+625.000	Slope =	NORMAL	Station:	970+637.500
S.Level =	2152.36	B.C. =	2.50 Kg/cm²	S.Level =	2151.635
T.O.F =	2146			T.O.F =	2146
Height =	6.360	Length =	12.50	Height =	5.635
		Based Height =	6.360		
		Ave. Height =	5.998		

Retaining Wall

STRIP NO. 7 / 4

Suprv'g. Consultant : ***ITAL CONSULT***		***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***	
Civil Engineer	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 4

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	7.00	0.30	0.77	1.00	2.50	0.80	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 7 / 4	MK1	0.70 4.17	15	14	4.87	0.00	4.87	84	409.080	1.210	494.987
	MK2	4.17 0.70	15	25	4.87	0.00	4.87	84	409.080	3.854	1576.594
	MK3 O.L=60xØ	X = 0.70 11.30 1.94	15	14	14.64	0.00	14.64	58	849.120	1.210	1027.435
	MK4	1.83 0.40	20	22	2.23	0.00	2.23	63	140.490	2.980	418.660
	MK5	3.62 0.40	20	22	4.02	0.00	4.02	63	253.260	2.980	754.715
	MK6	5.88	20	22	5.88	0.00	5.88	63	370.440	2.980	1103.911
	MK7 Min= 1.66	0.20 Ave= 2.02 Max= 2.38	30	18	2.22	0.00	2.22	42	93.135	2.000	186.270
	MK8 Min= 5.55	0.20 93.814° Ave= 5.90 Max= 6.27	15	16	6.10	0.00	6.10	84	512.190	1.580	809.260
	MK9	1.22 93.814° 0.30	20	16	1.52	0.00	1.52	63	95.760	1.580	151.301
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	28	373.520	1.210	451.959
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12var.	Min= 2.10 Ave= 5.98 Max= 9.86	15	12	5.98	0.00	5.98	8	47.864	0.888	42.503
										SUB TOTAL =	**7,628.043**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Retaining Wall

Page: 3 of 4

Drwg. No. _____

STRIP NO. 7 / 4

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	7.000	0.300	0.770	1.000	2.500	0.800	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 7 / 4	MK12edge O.L=60xØ	12 1.14	15	12	13.14	0.00	13.14	2	26.282	0.888	23.338
										SUB TOTAL =	**23.338**
										TOTAL =	**7,651.381**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	676.288
14	1974.381
16	960.561
18	186.270
20	
22	2277.286
25	1576.594
28	
30	
32	
36	
TOTAL =	**7,651.381**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 7 / 4 **TYPE 1**

Station:	970+625.000	Slope =	NORMAL	Station:	970+637.500
S.Level =	2152.36	B.C. =	2.50 Kg/cm²	S.Level =	2151.635
T.O.F. =	2146	Ave. Height =	6.00	T.O.F. =	2146
Height =	6.36	Based Height =	6.36	Height =	5.635

Quantity of Concrete			
	Area	Legth	Volume
Wall	3.209	12.400	39.787
Found'n	3.416	12.400	42.358
Key			
		Total Volume =	**82.146**

Retaining Wall
STRIP NO. 7 / 4

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 6 / 8

TYPE 1

Station:	970+637.500	Slope =	NORMAL	Station:	970+650.000
S.Level =	2151.635	B.C. =	2.50 Kg/cm²	S.Level =	2150.91
T.O.F =	2146			T.O.F =	2146
Height =	5.635	Length =	12.50	Height =	4.910
		Based Height =	5.635		
		Ave. Height =	5.273		

Retaining Wall

STRIP NO. 6 / 8

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 8

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.00	0.30	0.70	0.90	2.00	0.60	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 8	MK1	0.50 3.50	15	14	4.00	0.00	4.00	84	336.000	1.210	406.560
	MK2	3.50 0.50	15	22	4.00	0.00	4.00	84	336.000	2.980	1001.280
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	48	683.520	1.210	827.059
	MK4	1.48 0.33	20	18	1.80	0.00	1.80	63	113.400	2.000	226.800
	MK5	3.10 0.40	20	22	3.50	0.00	3.50	63	220.500	2.980	657.090
	MK6	4.59	20	16	4.59	0.00	4.59	63	289.170	1.580	456.889
	MK7	0.20 Ave= 2.32 Min= 1.96 Max= 2.69	30	22	2.52	0.00	2.52	42	105.945	2.980	315.716
	MK8	0.20 93.814° Ave= 5.17 Min= 4.82 Max= 5.55	20	16	5.37	0.00	5.37	63	338.468	1.580	534.779
	MK9	1.02 93.814° 0.30	20	16	1.32	0.00	1.32	63	83.160	1.580	131.393
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	26	346.840	1.210	419.676
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	20	264.400	0.888	234.787
	MK12var.	Min= 2.10 Ave= 5.98 Max= 9.86	15	12	5.98	0.00	5.98	8	47.864	0.888	42.503
										SUB TOTAL =	**5,559.756**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 8

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	6.000	0.300	0.700	0.900	2.000	0.600	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 6 / 8	MK12edge O.L=60xØ	12 / 1.14	15	12	13.14	0.00	13.14	2	26.282	0.888	23.338
										SUB TOTAL =	**23.338**
										TOTAL =	**5,583.094**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	605.852
14	1653.296
16	1123.060
18	226.800
20	
22	1974.086
25	
28	
30	
32	
36	
TOTAL =	**5,583.094**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 6 / 8 **TYPE 1**

Station:	970+637.500	Slope =	NORMAL	Station:	970+650.000
S.Level =	2151.635	B.C. =	2.50 Kg/cm²	S.Level =	2150.91
T.O.F. =	2146	Ave. Height =	5.27	T.O.F. =	2146
Height =	5.635	Based Height =	5.64	Height =	4.91

Quantity of Concrete

	Area	Legth	Volume
Wall	2.636	12.450	32.821
Found'n	2.160	12.450	26.892
Key			
		Total Volume =	**59.713**

Retaining Wall

STRIP NO. 6 / 8

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

(BEARING CAPACITY = 4.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
10.00	0.40	1.25	1.50	3.50	1.30	0.50	ø16 @ 10 L = 7.63	ø32 @ 10 L = 7.63	ø16 @ 15	ø32 @ 10 L = 4.47	ø37 @ 24 L = 8.39	ø32 @ 16 L = 6.04	ø22 @ 24 L = 4.86	ø16 @ 15 L = 10.50	ø16 @ 15 L = 1.62	ø16 @ 15	ø12 @ 15	ø12 @ 15	ø16 @ 16	16.85	1809.22
9.00	0.40	1.15	1.50	3.30	1.10	0.50	ø16ø12.5 L = 6.85	ø33 @ 12.5 L = 6.85	ø16 @ 15	ø28 @ 16 L = 3.66	ø30 @ 24 L = 5.72	ø28 @ 16 L = 7.86	ø22 @ 24 L = 4.23	ø16 @ 15 L = 9.50	ø16 @ 15 L = 1.72	ø16 @ 15	ø14 @ 15	ø12 @ 15	ø16 @ 16	14.05	1530.09
8.00	0.40	1.07	1.40	2.80	1.00	0.40	ø16 @ 12 L = 6.07	ø25 @ 12 L = 6.07	ø16 @ 15	ø25 @ 16 L = 3.02	ø25 @ 24 L = 4.72	ø25 @ 16 L = 6.66	ø20 @ 24 L = 3.71	ø16 @ 15 L = 8.90	ø16 @ 15 L = 1.62	ø16 @ 15	ø14 @ 15	ø12 @ 15	ø16 @ 16	11.47	981.22
7.00	0.40	0.98	1.20	2.40	0.70	0.40	ø16ø12.5 L = 5.55	ø25ø12.5 L = 5.55	ø16 @ 15	ø20 @ 16 L = 2.25	ø22 @ 24 L = 4.00	ø20 @ 16 L = 5.71	ø16 @ 24 L = 3.05	ø16 @ 15 L = 7.50	ø16 @ 15 L = 1.32	ø16 @ 15	ø14 @ 15	ø12 @ 15	ø16 @ 16	8.37	719.56
6.00	0.40	0.90	1.00	2.20	0.70	–	ø14 @ 15 L = 4.60	ø28 @ 15 L = 4.60	ø16 @ 15	ø16 @ 15 L = 1.89	ø18 @ 24 L = 3.35	ø16 @ 16 L = 6.59	ø16 @ 24 L = 2.74	ø16 @ 15 L = 6.00	ø16 @ 15 L = 1.32	ø14 @ 15	ø14 @ 15	ø12 @ 15	–	5.77	624.61
5.00	0.30	0.72	0.80	1.80	0.60	–	ø14 @ 15 L = 3.72	ø22 @ 15 L = 3.72	ø14 @ 15	ø22 @ 15 L = 1.93	–	ø22 @ 16 L = 4.56	ø16 @ 32 L = 2.41	ø15 @ 20 L = 5.40	ø16 @ 20 L = 1.22	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	4.53	375.03
4.00	0.25	0.58	0.60	1.50	0.50	–	ø14 @ 15 L = 2.95	ø20 @ 15 L = 2.95	ø14 @ 15	ø16 @ 16 L = 1.49	–	ø16 @ 16 L = 3.55	ø14 @ 32 L = 1.82	ø15 @ 20 L = 4.33	ø16 @ 20 L = 1.12	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	3.01	253.09
3.00	0.25	0.50	0.50	1.20	0.40	–	ø14 @ 15 L = 2.40	ø16 @ 15 L = 2.40	ø14 @ 15	ø16 @ 20 L = 1.24	–	ø16 @ 20 L = 2.74	ø14 @ 40 L = 1.62	ø15 @ 20 L = 3.35	ø16 @ 20 L = 1.02	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	2.01	168.38

(BEARING CAPACITY = 3.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
10.00	0.40	1.25	2.00	4.40	1.30	0.40	ø16 @ 8 L = 8.63	ø32 @ 8 L = 8.63	ø16 @ 15	ø32 @ 10 L = 4.07	ø32 @ 24 L = 5.29	ø32 @ 16 L = 9.04	ø22 @ 24 L = 4.86	ø16 @ 15 L = 10.50	ø16 @ 15 L = 1.62	ø16 @ 14	ø14 @ 15	ø12 @ 15	ø16 @ 16	17.69	1918.58
9.00	0.40	1.15	1.80	3.80	1.10	0.40	ø16 @ 11 L = 7.35	ø32 @ 11 L = 7.35	ø16 @ 15	ø25 @ 16 L = 3.46	ø30 @ 24 L = 5.72	ø28 @ 16 L = 7.86	ø22 @ 24 L = 4.23	ø16 @ 15 L = 9.50	ø16 @ 15 L = 1.72	ø16 @ 15	ø14 @ 15	ø12 @ 15	ø16 @ 16	14.42	1432.31
8.00	0.40	1.07	1.60	3.20	1.00	0.40	ø16 @ 12 L = 6.27	ø25 @ 12 L = 6.27	ø16 @ 15	ø25 @ 16 L = 3.02	ø25 @ 24 L = 4.72	ø25 @ 16 L = 6.66	ø20 @ 24 L = 3.71	ø16 @ 15 L = 8.90	ø16 @ 15 L = 1.62	ø16 @ 15	ø14 @ 15	ø12 @ 15	ø16 @ 16	11.57	996.10
7.00	0.40	0.98	1.20	2.40	0.70	0.40	ø16ø12.5 L = 5.55	ø25ø12.5 L = 5.55	ø16 @ 15	ø20 @ 16 L = 2.25	ø22 @ 24 L = 4.00	ø20 @ 16 L = 5.71	ø16 @ 24 L = 3.05	ø16 @ 15 L = 7.50	ø16 @ 15 L = 1.32	ø16 @ 15	ø14 @ 15	ø12 @ 15	ø16 @ 16	8.27	719.56
6.00	0.30	0.90	1.00	2.20	0.70	–	ø14 @ 15 L = 4.60	ø28 @ 15 L = 4.60	ø14 @ 15	ø16 @ 15 L = 1.89	ø18 @ 24 L = 3.35	ø16 @ 16 L = 6.59	ø16 @ 24 L = 2.74	ø16 @ 15 L = 6.00	ø16 @ 15 L = 1.32	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	6.10	510.64
5.00	0.30	0.72	0.80	1.80	0.60	–	ø14 @ 15 L = 3.72	ø22 @ 15 L = 3.72	ø14 @ 15	ø22 @ 15 L = 1.93	–	ø22 @ 16 L = 4.56	ø16 @ 32 L = 2.41	ø15 @ 20 L = 5.40	ø16 @ 20 L = 1.22	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	4.53	375.03
4.00	0.25	0.58	0.60	1.50	0.50	–	ø14 @ 15 L = 2.95	ø20 @ 15 L = 2.95	ø14 @ 15	ø16 @ 16 L = 1.49	–	ø16 @ 16 L = 3.55	ø14 @ 32 L = 1.82	ø15 @ 20 L = 4.33	ø16 @ 20 L = 1.12	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	3.01	256.96
3.00	0.25	0.50	0.50	1.20	0.40	–	ø14 @ 15 L = 2.40	ø16 @ 15 L = 2.40	ø14 @ 15	ø16 @ 16 L = 1.24	–	ø16 @ 16 L = 2.74	ø14 @ 32 L = 1.62	ø15 @ 20 L = 3.35	ø16 @ 20 L = 1.02	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	2.01	177.43

(BEARING CAPACITY = 2.50 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
10.00	0.40	1.25	2.30	4.80	1.30	–	ø20 @ 10 L = 8.63	ø32 @ 10 L = 8.63	ø16 @ 15	ø32 @ 16 L = 3.77	ø33 @ 24 L = 5.40	ø32 @ 16 L = 9.04	ø22 @ 24 L = 4.86	ø16 @ 15 L = 10.50	ø16 @ 15 L = 1.62	ø16 @ 15	ø14 @ 15	ø12 @ 15	–	19.29	1998.30
9.00	0.40	1.15	2.00	4.20	1.10	–	ø16 @ 10 L = 8.25	ø32 @ 10 L = 8.25	ø16 @ 15	ø29 @ 16 L = 3.66	ø30 @ 24 L = 5.72	ø28 @ 16 L = 7.86	ø22 @ 24 L = 4.23	ø16 @ 15 L = 9.50	ø16 @ 15 L = 1.72	ø16 @ 15	ø14 @ 15	ø12 @ 15	–	16.06	1644.85
8.00	0.40	1.07	1.70	3.50	1.00	–	ø18ø12.5 L = 7.07	ø32ø12.5 L = 7.07	ø16 @ 15	ø28 @ 16 L = 2.62	ø25 @ 24 L = 4.72	ø28 @ 16 L = 6.66	ø20 @ 24 L = 3.71	ø16 @ 15 L = 8.90	ø16 @ 15 L = 1.62	ø16 @ 15	ø14 @ 15	ø12 @ 15	–	12.13	1114.47
7.00	0.40	0.98	1.50	2.80	0.80	–	ø16 @ 15 L = 5.55	ø32 @ 15 L = 5.55	ø16 @ 15	ø20 @ 16 L = 1.95	ø22 @ 24 L = 4.01	ø20 @ 16 L = 5.71	ø16 @ 24 L = 3.05	ø16 @ 15 L = 7.50	ø16 @ 15 L = 1.42	ø16 @ 15	ø14 @ 15	ø12 @ 15	–	8.81	790.01
6.00	0.30	0.90	1.00	2.20	0.70	–	ø14 @ 15 L = 4.60	ø28 @ 15 L = 4.60	ø14 @ 15	ø16 @ 15 L = 1.89	ø22 @ 24 L = 3.60	ø16 @ 16 L = 4.89	ø16 @ 24 L = 2.74	ø16 @ 15 L = 6.49	ø16 @ 15 L = 1.32	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	5.10	510.64
5.00	0.30	0.72	0.80	1.80	0.60	–	ø14 @ 15 L = 3.72	ø22 @ 15 L = 3.72	ø14 @ 15	ø22 @ 15 L = 1.93	–	ø22 @ 16 L = 4.56	ø16 @ 32 L = 2.41	ø15 @ 20 L = 5.40	ø16 @ 20 L = 1.22	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	4.53	375.03
4.00	0.25	0.58	0.60	1.50	0.50	–	ø14 @ 15 L = 2.95	ø20 @ 15 L = 2.95	ø14 @ 15	ø16 @ 16 L = 1.49	–	ø16 @ 16 L = 3.55	ø14 @ 32 L = 1.82	ø15 @ 20 L = 4.33	ø16 @ 20 L = 1.12	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	3.01	256.96
3.00	0.25	0.50	0.50	1.20	0.40	–	ø14 @ 15 L = 2.40	ø16 @ 15 L = 2.40	ø14 @ 15	ø16 @ 16 L = 1.24	–	ø16 @ 16 L = 2.74	ø14 @ 32 L = 1.62	ø15 @ 20 L = 3.35	ø16 @ 20 L = 1.02	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	2.01	177.43

(BEARING CAPACITY = 2.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
9.00	0.40	1.15	2.50	4.60	1.20	–	ø20 @ 11 L = 8.29	ø33 @ 11 L = 8.29	ø16 @ 15	ø28 @ 16 L = 3.16	ø30 @ 24 L = 5.73	ø28 @ 16 L = 7.86	ø22 @ 24 L = 4.23	ø16 @ 15 L = 9.50	ø16 @ 15 L = 1.62	ø16 @ 15	ø14 @ 15	ø12 @ 15	–	15.86	1585.25
8.00	0.40	1.07	1.80	4.20	1.10	–	ø18ø12.5 L = 8.07	ø30ø12.5 L = 8.07	ø16 @ 15	ø25 @ 16 L = 2.27	ø25 @ 24 L = 4.73	ø25 @ 16 L = 6.66	ø20 @ 24 L = 3.71	ø16 @ 15 L = 8.90	ø16 @ 15 L = 1.72	ø16 @ 15	ø14 @ 15	ø12 @ 15	–	13.75	1154.13
7.00	0.40	0.98	1.40	3.10	0.90	–	ø16 @ 13 L = 6.06	ø32 @ 15 L = 6.06	ø16 @ 15	ø20 @ 16 L = 1.95	ø22 @ 24 L = 4.01	ø20 @ 16 L = 5.71	ø16 @ 24 L = 3.05	ø16 @ 15 L = 7.50	ø16 @ 15 L = 1.42	ø16 @ 15	ø14 @ 15	ø12 @ 15	–	9.23	790.95
6.00	0.30	0.90	1.20	2.40	0.70	–	ø16 @ 15 L = 4.60	ø28 @ 15 L = 4.60	ø16 @ 15	ø16 @ 16 L = 1.89	ø22 @ 24 L = 3.60	ø16 @ 16 L = 4.89	ø16 @ 24 L = 2.74	ø16 @ 15 L = 6.49	ø16 @ 15 L = 1.32	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	6.38	557.12
5.00	0.30	0.72	0.80	1.80	0.60	–	ø14 @ 15 L = 3.72	ø22 @ 15 L = 3.72	ø14 @ 15	ø22 @ 15 L = 1.93	–	ø22 @ 16 L = 4.56	ø16 @ 32 L = 2.41	ø15 @ 20 L = 5.40	ø16 @ 20 L = 1.22	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	4.59	379.43
4.00	0.25	0.58	0.60	1.50	0.50	–	ø14 @ 15 L = 2.95	ø20 @ 15 L = 2.95	ø14 @ 15	ø16 @ 16 L = 1.49	–	ø16 @ 16 L = 3.55	ø14 @ 32 L = 1.82	ø15 @ 20 L = 4.33	ø16 @ 20 L = 1.12	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	3.01	256.96
3.00	0.25	0.50	0.50	1.20	0.40	–	ø14 @ 15 L = 2.40	ø16 @ 15 L = 2.40	ø14 @ 15	ø16 @ 16 L = 1.24	–	ø16 @ 16 L = 2.74	ø14 @ 32 L = 1.62	ø15 @ 20 L = 3.35	ø16 @ 20 L = 1.02	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	2.01	177.43

(BEARING CAPACITY = 1.50 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
8.00	0.30	0.97	2.50	4.30	1.00	–	ø20 @ 11 L = 8.87	ø28 @ 11 L = 8.87	ø16 @ 15	ø28 @ 16 L = 2.88	ø25 @ 24 L = 4.72	ø25 @ 16 L = 7.20	ø22 @ 24 L = 5.89	ø16 @ 15 L = 8.46	ø16 @ 15 L = 1.62	ø16 @ 15	ø14 @ 15	ø12 @ 15	–	13.13	1398.24
7.00	0.30	0.85	2.00	3.80	0.90	–	ø18ø12.5 L = 7.38	ø28ø12.5 L = 7.38	ø16 @ 15	ø22 @ 16 L = 2.23	ø25 @ 24 L = 4.31	ø22 @ 13 L = 5.65	ø16 @ 24 L = 3.82	ø16 @ 15 L = 7.40	ø16 @ 15 L = 1.52	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	10.16	950.97
6.00	0.30	0.80	1.50	3.00	0.80	–	ø16 @ 15 L = 5.60	ø28 @ 15 L = 5.60	ø16 @ 15	ø18 @ 16 L = 1.78	ø22 @ 24 L = 3.81	ø16 @ 16 L = 4.68	ø16 @ 24 L = 2.74	ø16 @ 15 L = 6.49	ø16 @ 15 L = 1.42	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	7.64	681.15
5.00	0.30	0.72	1.00	2.00	0.60	–	ø14 @ 15 L = 4.32	ø25 @ 15 L = 4.32	ø14 @ 15	ø22 @ 16 L = 1.93	–	ø22 @ 16 L = 4.56	ø16 @ 32 L = 2.41	ø15 @ 20 L = 5.40	ø16 @ 20 L = 1.22	ø14 @ 15	ø12 @ 15	ø12 @ 15	–	4.88	443.80
4.00	0.25	0.58	0.70	1.50	0.50	–	ø14 @ 15 L = 3.18	ø20 @ 15 L = 3.18	ø14 @ 15	ø16 @ 16 L = 1.49	–	ø16 @ 16 L = 3.55	ø14 @ 32 L = 1.82	ø15 @ 20 L = 4.33	ø16 @ 20 L = 1.12	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	3.11	284.07
3.00	0.25	0.50	0.50	1.20	0.40	–	ø14 @ 15 L = 2.40	ø16 @ 15 L = 2.40	ø14 @ 15	ø16 @ 16 L = 1.24	–	ø16 @ 16 L = 2.74	ø14 @ 32 L = 1.62	ø15 @ 20 L = 3.35	ø16 @ 20 L = 1.02	ø12 @ 15	ø12 @ 15	ø12 @ 15	–	2.01	177.43

TYP. ELEVATON OF WALL PANEL
(SHOWING DIMENSIONS)

CROSS SECTION
(DIMENSIONS)

TYP. ELEVATON OF WALL PANEL
(SHOWING REINFORCEMENT)

CROSS SECTION
(REINFORCEMENT)

NOTE :

FOR GENERAL NOTES, SEE DRWG. No. ST/RW/01

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة المواصلات
MINISTRY OF COMMUNICATIONS
ادارة التصميم
DESIGN DEPARTMENT

إصلاح الجزء المتقل من عقبة ضلع (المرحلة الثانية)

THE SAUDI ENGINEER
Consulting Engineers & Architects
P.O.Box: 5341 Riyadh Tel: 476887

المهندس السعودي
مكاتب استشاريون ومعماريون
سعر - ب - ا (المواجهة AVE) - ا - EVELAAN

Title: عنوان المخطط
STANDARD OF RETAINING WALL TYPE – 2
(back slope 1:3 & 1:4)

MOC Approval موافقة الوزارة
STAMP:

DRWS.N:	DATE:	SCALE:
ST/RW/02	01/1415 06/1994	1:100

Drawn:	Designed:	Checked:	Approved:	Date:
NJD	NSS	NSS	ASA	

040115 / 120694
SADRWALT / nelson

Ministry TYPE 2

BEARING CAPACITY =4.00 Kg/cm² (Type 2)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
10.00	0.40	1.23	1.80	3.60	1.20	0.80	Ø18 @10 L=7.63	Ø32 @10 L=7.63	Ø16 @15	Ø32 @16 L=4.47	Ø32 @24 L=6.39	Ø32 @16 L=9.04	Ø25 @24 L=2.56	Ø16 @15 L=10.50	Ø16 @ 15 L=1.82	Ø18 @ 15	Ø16 @ 15	Ø12 @ 15	Ø16 @ 16	16.86	1809.22
9.00	0.40	1.15	1.60	3.20	1.10	0.60	Ø18 @12.5 L=6.85	Ø32@12.5 L=6.85	Ø16 @15	Ø28 @16 L=3.66	Ø30 @24 L=5.72	Ø28@16 L=7.86	Ø22 @24 L=4.25	Ø16 @15 L=9.50	Ø16 @ 15 L=1.72	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16	14.05	1330.05
8.00	0.40	1.07	1.40	2.80	1.00	0.40	Ø16 @12 L=6.07	Ø28 @12 L=6.07	Ø16 @15	Ø20 @16 L=3.02	Ø25 @ 24 L= 4.72	Ø25 @16 L=6.86	Ø20 @24 L=3.71	Ø16 @15 L=8.60	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16	11.47	981.22
7.00	0.40	0.98	1.20	2.40	0.70	0.40	Ø16 @12.5 L=5.08	Ø28 @12.5 L=5.08	Ø16 @15	Ø20 @16 L=2.25	Ø22 @24 L=4.00	Ø20 @16 L=5.71	Ø16 @24 L=3.08	Ø16 @15 L=7.50	Ø16 @ 15 L=1.32	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16	8.37	719.56
6.00	0.40	0.90	1.00	2.20	0.70	-	Ø14 @15 L=4.60	Ø28 @15 L=4.60	Ø16 @15	Ø18 @16 L=1.69	Ø18 @24 L=3.26	Ø18 @16 L=4.89	Ø16 @24 L=2.74	Ø16 @15 L=6.50	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø14 @ 15	Ø12 @ 15		6.77	524.61
5.00	0.30	0.72	0.80	1.80	0.60	-	Ø14 @15 L=3.72	Ø22 @15 L=3.72	Ø14 @15	Ø22 @16 L=1.93		Ø22 @16 L=4.56	Ø16 @32 L=2.41	Ø16 @20 L=5.40	Ø16 @20 L=1.22	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		4.53	375.03
4.00	0.25	0.58	0.60	1.50	0.50	-	Ø14 @15 L=2.98	Ø20 @15 L=2.98	Ø14 @15	Ø18 @16 L=1.49		Ø18 @16 L=3.55	Ø14 @32 L=1.95	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		3.01	253.09
3.00	0.25	0.50	0.50	1.20	0.40	-	Ø14 @15 L=2.40	Ø16 @15 L=2.40	Ø14 @15	Ø16 @20 L=1.24		Ø16 @ 20 L=2.74	Ø14 @ 40 L=1.62	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.01	168.36

Retain Wall TYPE 2

BEARING CAPACITY =3.00 Kg/cm² (Type2)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
10.00	0.40	1.23	2.00	4.40	1.20	0.40	Ø16 @ 9 L=8.63	Ø32 @ 9 L=8.63	Ø16 @15	Ø32 @ 16 L=4.07	Ø32 @ 24 L=6.39	Ø32 @ 16 L=9.04	Ø25 @24 L=4.86	Ø16 @ 15 L=10.50	Ø16 @ 15 L=1.82	Ø16 @ 14	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16	17.69	1918.35
9.00	0.40	1.15	1.80	3.50	1.10	0.40	Ø18 @ 11 L=7.35	Ø32 @ 11 L=7.35	Ø16 @15	Ø28 @ 16 L=3.46	Ø30 @ 24 L=5.72	Ø28 @ 16 L=7.86	Ø22@24 L=4.23	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.72	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16	14.42	1432.31
8.00	0.40	1.07	1.50	2.90	1.00	0.40	Ø16 @12 L=6.27	Ø28 @12 L=6.27	Ø16 @15	Ø25 @16 L=3.02	Ø25 @24 L=4.72	Ø25 @16 L=6.86	Ø20 @24 L=3.71	Ø16 @ 15 L=8.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16	11.67	996.10
7.00	0.40	0.98	1.20	2.40	0.70	0.40	Ø16 @12.5 L=5.08	Ø28 @12.5 L=5.08	Ø16 @15	Ø20 @16 L=2.25	Ø22 @24 L=4.00	Ø20 @16 L=5.71	Ø16 @24 L=3.08	Ø16 @ 15 L=7.50	Ø16 @ 15 L=1.32	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16	8.37	719.56
6.00	0.30	0.80	1.00	2.20	0.70	-	Ø14 @15 L=4.50	Ø28 @15 L=4.50	Ø14 @15	Ø18 @16 L=1.69	Ø22 @ 24 L=3.60	Ø18 @16 L=4.89	Ø16 @24 L=2.74	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		6.10	510.84
5.00	0.30	0.72	0.80	1.80	0.60	-	Ø14 @15 L=3.72	Ø22 @15 L=3.72	Ø14 @15	Ø22 @16 L=1.93		Ø22 @16 L=4.56	Ø16 @32 L=2.41	Ø16 @20 L=5.40	Ø16 @20 L=1.22	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		4.53	375.03
4.00	0.25	0.58	0.60	1.50	0.50	-	Ø14 @15 L=2.98	Ø20 @15 L=2.98	Ø14 @15	Ø18 @16 L=1.49		Ø18 @16 L=3.55	Ø16 @ 32 L=2.08	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		3.01	255.96
3.00	0.25	0.50	0.50	1.20	0.40	-	Ø14 @15 L=2.40	Ø16 @15 L=2.40	Ø14 @15	Ø16 @16 L=1.24		Ø16 @16 L=2.74	Ø14 @ 32 L=1.62	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.01	177.43

BEARING CAPACITY =2.50 Kg/cm² (Type2)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
10.00	0.40	1.23	2.50	4.80	1.30	-	Ø20 @ 10 L=9.63	Ø32 @ 10 L=9.63	Ø16 @15	Ø32 @ 16 L=3.77	Ø32 @ 24 L=6.40	Ø32 @ 16 L=9.04	Ø25 @24 L=4.86	Ø16 @ 15 L=10.50	Ø16 @ 15 L=1.92	Ø18 @ 15	Ø14 @ 15	Ø12 @ 15		19.26	1996.30
9.00	0.40	1.15	2.00	4.20	1.10	-	Ø18 @ 10 L=8.25	Ø32 @ 10 L=8.25	Ø16 @15	Ø28 @ 16 L=3.09	Ø30 @ 24 L=5.72	Ø28 @ 16 L=7.86	Ø22 @ 24 L=4.23	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.72	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		15.06	1544.65
8.00	0.40	1.07	1.70	3.50	1.00	-	Ø18 @12.5 L=7.07	Ø32 @12.5 L=7.07	Ø16 @15	Ø25 @16 L=2.62	Ø25 @24 L=4.72	Ø25 @16 L=6.86	Ø20 @24 L=3.71	Ø16 @ 15 L=8.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		12.13	1114.47
7.00	0.40	0.98	1.30	2.80	0.80	-	Ø18 @15 L=5.68	Ø32 @15 L=5.68	Ø16 @15	Ø20 @16 L=1.95	Ø22 @24 L=4.01	Ø20 @16 L=5.71	Ø16 @24 L=3.08	Ø16 @ 15 L=7.50	Ø16 @ 15 L=1.42	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		8.91	760.01
6.00	0.30	0.80	1.00	2.20	0.70	-	Ø14 @15 L=4.50	Ø28 @15 L=4.50	Ø14 @15	Ø18 @16 L=1.69	Ø22 @ 24 L=3.60	Ø18 @16 L=4.89	Ø16 @24 L=2.74	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		6.10	510.84
5.00	0.30	0.72	0.80	1.80	0.60	-	Ø14 @15 L=3.72	Ø22 @15 L=3.72	Ø14 @15	Ø22 @16 L=1.93		Ø22 @16 L=4.56	Ø16 @32 L=2.41	Ø16 @20 L=5.40	Ø16 @20 L=1.22	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		4.53	375.03
4.00	0.25	0.58	0.60	1.50	0.50	-	Ø14 @15 L=2.98	Ø20 @15 L=2.98	Ø14 @15	Ø18 @16 L=1.49		Ø18 @16 L=3.55	Ø16 @ 24 L=2.08	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		3.01	259.37
3.00	0.25	0.50	0.50	1.20	0.40	-	Ø14 @15 L=2.40	Ø16 @15 L=2.40	Ø14 @15	Ø16 @16 L=1.24		Ø16 @16 L=2.74	Ø14 @ 32 L=1.62	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.01	177.43

BEARING CAPACITY =2.00 Kg/cm² (Type 2)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
9.00	0.40	1.15	2.50	4.60	1.20	-	Ø20 @ 11 L=9.25	Ø30 @ 11 L=9.25	Ø16 @15	Ø28 @ 16 L=3.16	Ø30 @ 24 L=5.73	Ø28 @ 16 L=7.86	Ø22 @ 24 L=4.23	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.82	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		16.86	1556.25
8.00	0.40	1.07	1.90	4.20	1.10	-	Ø18 @12.5 L=8.07	Ø30 @12.5 L=8.07	Ø16 @15	Ø25 @16 L=2.72	Ø25 @24 L=4.73	Ø25 @16 L=6.86	Ø20 @24 L=3.71	Ø16 @ 15 L=8.50	Ø16 @ 15 L=1.72	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		13.75	1154.13
7.00	0.40	0.98	1.40	3.10	0.80	-	Ø18 @15 L=6.08	Ø32 @15 L=6.08	Ø16 @15	Ø20 @16 L=1.95	Ø22 @24 L=4.01	Ø20 @16 L=5.71	Ø16 @24 L=3.08	Ø16 @ 15 L=7.50	Ø16 @ 15 L=1.42	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		9.23	790.55
6.00	0.30	0.80	1.20	2.40	0.70	-	Ø16 @15 L=4.90	Ø28 @15 L=4.9	Ø16 @15	Ø18 @16 L=1.69	Ø22 @ 24 L=3.60	Ø18 @16 L=4.89	Ø16 @24 L=2.74	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		6.38	567.12
5.00	0.30	0.72	0.80	1.90	0.60	-	Ø14 @15 L=3.82	Ø22 @15 L=3.82	Ø14 @15	Ø22 @16 L=1.93		Ø22 @16 L=4.56	Ø16 @32 L=2.41	Ø16 @20 L=5.40	Ø16 @20 L=1.22	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		4.59	379.43
4.00	0.25	0.58	0.60	1.50	0.50	-	Ø14 @15 L=2.98	Ø20 @15 L=2.98	Ø14 @15	Ø16 @16 L=1.49		Ø18 @16 L=3.55	Ø16 @ 32 L=2.08	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		3.01	255.96
3.00	0.25	0.50	0.50	1.20	0.40	-	Ø14 @15 L=2.40	Ø16 @15 L=2.40	Ø14 @15	Ø16 @16 L=1.24		Ø16 @16 L=2.74	Ø14 @ 32 L=1.62	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.01	177.43

BEARING CAPACITY =1.50 Kg/cm² (Type 2)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
8.00	0.30	0.97	2.60	4.50	1.00	-	Ø20 @11 L=8.87	Ø28 @11 L=8.87	Ø16 @15	Ø28 @16 L=2.96	Ø25 @24 L=4.72	Ø28 @16 L=7.20	Ø22 @24 L=3.89	Ø16 @ 15 L=8.40	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15		13.13	1358.24
7.00	0.30	0.88	2.00	3.80	0.90	-	Ø18 @12.5 L=7.38	Ø28 @12.5 L=7.38	Ø16 @15	Ø22 @16 L=2.23	Ø25 @24 L=4.31	Ø22 @16 L=5.85	Ø18 @24 L=3.22	Ø16 @ 15 L=7.40	Ø16 @ 15 L=1.52	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		10.16	930.67
6.00	0.30	0.80	1.50	3.00	0.80	-	Ø16 @15 L=5.90	Ø28 @15 L=5.90	Ø16 @15	Ø18 @16 L=1.79	Ø22 @ 24 L=3.61	Ø16 @16 L=4.89	Ø16 @24 L=2.74	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.42	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		7.54	631.15
5.00	0.30	0.72	1.00	2.00	0.60	-	Ø14 @15 L=4.32	Ø25 @15 L=4.32	Ø14 @15	Ø22 @16 L=1.93		Ø22 @16 L=4.56	Ø16 @32 L=2.41	Ø16 @15 L=5.40	Ø16 @ 15 L=1.22	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15		4.89	443.80
4.00	0.25	0.58	0.70	1.60	0.50	-	Ø14 @15 L=3.18	Ø20 @15 L=3.18	Ø14 @15	Ø18 @16 L=1.49		Ø18 @16 L=3.55	Ø16 @ 32 L=2.08	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		3.11	264.07
3.00	0.25	0.50	0.50	1.20	0.40	-	Ø14 @15 L=2.40	Ø16 @15 L=2.40	Ø14 @15	Ø16 @16 L=1.24		Ø16 @16 L=2.74	Ø14 @ 32 L=1.62	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.01	177.43

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 1 of 1

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

From: Sta.976+150 to Sta.976+275

TOTAL WEIGHT OF STEEL PER BAR DIAMETER

STRIP NO.101 to 82

Length = 125.000 m.

S U M M A R Y

BAR SIZE (mm)	WEIGHT (kg)	FOOTING	Remaining
8			
10			
12	4039.964	0.000	4039.964
14	5649.490	0.000	5649.490
16	50968.196	33441.016	17527.180
18	0.000	0.000	0.000
20	4068.421	0.000	4068.421
22	0.000	0.000	0.000
25	39826.465	17618.176	22208.289
28	0.000	0.000	0.000
30	0.000	0.000	0.000
32	44632.910	44632.910	0.000
36	0.000		
TOTAL =	**149,185.45**	**95,692.102**	**53,493.344**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : TAIF AL BAHA - ABHA ROAD — Page: 1 of 1

Item : 50202 REINFORCED CONCRETE Class 280/20 — Drwg. No. _____

Retaining Wall

From: Sta.976+150 to Sta.976+275

TOTAL VOLUME OF CONCRETE PER STRIP

STRIP NO.101 to 82

Length = 125.000 m.

S U M M A R Y

LOCATION	VOLUME (m³)	FOOTING	Remaining
STRIP NO. 801	146.569	78.062	68.507
STRIP NO. 802	145.980	77.748	68.232
STRIP NO. 803	145.392	77.748	67.644
STRIP NO. 804	145.392	77.748	67.644
STRIP NO. 805	146.449	77.748	68.701
STRIP NO. 806	146.449	77.748	68.701
STRIP NO. 807	146.490	77.748	68.742
STRIP NO. 808	146.486	77.748	68.738
STRIP NO. 809	142.179	77.748	64.431
STRIP NO. 810	141.485	78.062	63.423
TOTAL =	**1,452.87**	**778.11**	**674.76**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 801 **TYPE 2**

Station:	976+150.000	Slope =	3:1	Station:	976+162.500
S.Level =	2133.64	B.C. =	2.50 Kg/cm²	S.Level =	2132.613
T.O.F =	2125.64			T.O.F =	2125.64
Height =	8.00	Length =	12.50	Height =	6.973
		Based Height =	8.00		
		Ave. Height =	7.49		

Retaining Wall
STRIP NO. 801

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 801

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 801	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7 Min= 2.38	0.30 Ave= 2.90 Max= 3.41	24	20	3.20	0.00	3.20	53	169.414	2.470	418.454
	MK8 Min= 6.89	0.30 94.764° Ave= 7.39 Max= 7.92	15	16	7.69	0.00	7.69	84	645.666	1.580	1020.152
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	36	484.560	1.580	765.605
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	36	480.240	1.210	581.090
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12var.	Min= 1.49 Ave= 6.06 Max=10.62	15	12	6.06	0.00	6.06	12	72.696	0.888	64.554
										SUB TOTAL =	**14,968.596**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 801

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 801	MK12edge	12 / 1.16	15	12	13.16	0.00	13.16	2	26.324	0.888	23.375
										SUB TOTAL =	**23.375**
										TOTAL =	**14,991.972**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	416.631
14	581.090
16	5129.859
18	
20	418.454
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,991.97**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 801 **TYPE 2**

Station:	976+150.000	Slope =	3:1	Station:	976+162.500
S.Level =	2133.64	B.C. =	2.50 Kg/cm²	S.Level =	2132.613
T.O.F. =	2125.64	Ave. Height =	7.49	T.O.F. =	2125.64
Height =	8	Based Height =	8.00	Height =	6.973

Quantity of Concrete			
	Area	Legth	Volume
Wall	5.503	12.450	68.507
Found'n	6.270	12.450	78.062
Key			
		Total Volume =	**146.569**

Retaining Wall
STRIP NO. 801

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 802 **TYPE 2**

Station:	976+162.500	Slope =	3:1	Station:	976+175.000
S.Level =	2132.613	B.C. =	2.50 Kg/cm²	S.Level =	2131.59
T.O.F =	2124.613			T.O.F =	2124.613
Height =	8.00	Length =	12.50	Height =	6.973
		Based Height =	8		
		Ave. Height =	7.49		

Retaining Wall
STRIP NO. 802

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 802

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 802	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7	0.30 Ave= 2.90 Min= 2.38 Max= 3.41	24	20	3.20	0.00	3.20	53	169.414	2.470	418.454
	MK8	0.30 94.764° Ave= 7.39 Min= 6.89 Max= 7.92	15	16	7.69	0.00	7.69	84	645.666	1.580	1020.152
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	36	484.560	1.580	765.605
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	36	480.240	1.210	581.090
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12var.	Min= 1.49 Ave= 6.06 Max=10.62	15	12	6.06	0.00	6.06	12	72.696	0.888	64.554
										SUB TOTAL =	**14,968.596**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 802

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 802	MK12edge	12 / 1.16	15	12	13.16	0.00	13.16	2	26.324	0.888	23.375
										SUB TOTAL =	23.375
										TOTAL =	14,991.972

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	416.631
14	581.090
16	5129.859
18	
20	418.454
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,991.97**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF CONCRETE

Project : TAIF AL BAHA - ABHA ROAD — Page: 4 of 4

Item : 50202 REINFORCED CONCRETE Class 280/20 — Drwg. No. _____

Retaining Wall

STRIP NO. 802 **TYPE 2**

Station:	976+162.500	Slope =	3:1	Station:	976+175.000
S.Level =	2132.613	B.C. =	2.50 Kg/cm²	S.Level =	2131.586
T.O.F. =	2124.613	Ave. Height =	7.49	T.O.F. =	2124.613
Height =	8	Based Height =	8.00	Height =	6.973

Quantity of Concrete

	Area	Legth	Volume
Wall	5.503	12.400	68.232
Found'n	6.270	12.400	77.748
Key			
		Total Volume =	**145.980**

Retaining Wall
STRIP NO. 802

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 803 **TYPE 2**

Station: 976+175.000	Slope = 3:1	Station: 976+187.500
S.Level = 2131.586	B.C. = 2.50 Kg/cm²	S.Level = 2130.43
T.O.F = 2123.586		T.O.F = 2123.586
Height = 8.00	Length = 12.50	Height = 6.844
	Based Height = 8	
	Ave. Height = 7.42	

Retaining Wall
STRIP NO. 803

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 803

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 803	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7	0.30 Ave= 2.83 Min= 2.25 Max= 3.41	24	20	3.13	0.00	3.13	53	165.996	2.470	410.010
	MK8	0.30 94.764° Ave= 7.32 Min= 6.76 Max= 7.92	15	16	7.62	0.00	7.62	84	640.248	1.580	1011.592
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	34	457.640	1.580	723.071
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	34	453.560	1.210	548.808
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12var.	Min= 1.09 Ave= 5.96 Max=10.83	15	12	5.96	0.00	5.96	14	83.437	0.888	74.092
										SUB TOTAL =	**14,862.836**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 803

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 803	MK12edge	12 1.17	15	12	13.17	0.00	13.17	2	26.346	0.888	23.395
										SUB TOTAL =	23.395
										TOTAL =	14,886.231

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	402.711
14	548.808
16	5078.765
18	
20	410.010
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,886.23**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 803 **TYPE 2**

Station:	976+175.000	Slope =	3:1	Station:	976+187.500
S.Level =	2131.586	B.C. =	2.50 Kg/cm²	S.Level =	2130.43
T.O.F. =	2123.586	Ave. Height =	7.42	T.O.F. =	2123.586
Height =	8	Based Height =	8.00	Height =	6.844

Quantity of Concrete

	Area	Legth	Volume
Wall	5.455	12.400	67.644
Found'n	6.270	12.400	77.748
Key			
		Total Volume =	**145.392**

Retaining Wall

STRIP NO. 803

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 804 **TYPE 2**

Station:	976+187.500	Slope =	3:1	Station:	976+200.000
S.Level =	2130.43	B.C. =	2.50 Kg/cm²	S.Level =	2129.274
T.O.F =	2122.43			T.O.F =	2122.43
Height =	8.00	Length =	12.50	Height =	6.844
		Based Height =	8		
		Ave. Height =	7.42		

Retaining Wall

STRIP NO. 804

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 804

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 804	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7 Min= 2.25	0.30 Ave= 2.83 Max= 3.41	24	20	3.13	0.00	3.13	53	165.996	2.470	410.010
	MK8 Min= 6.76	0.30 94.764° Ave= 7.32 Max= 7.92	15	16	7.62	0.00	7.62	84	640.248	1.580	1011.592
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	34	457.640	1.580	723.071
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	34	453.560	1.210	548.808
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	26	343.720	0.888	305.223
	MK12var.	Min= 1.09 Ave= 5.96 Max= 10.83	15	12	5.96	0.00	5.96	14	83.437	0.888	74.092
										SUB TOTAL =	**14,862.836**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 804

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 804	MK12edge	12 1.17	15	12	13.17	0.00	13.17	2	26.346	0.888	23.395
										SUB TOTAL =	**23.395**
										TOTAL =	**14,886.231**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	402.711
14	548.808
16	5078.765
18	
20	410.010
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,886.23**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 804 **TYPE 2**

Station:	976+187.500	Slope =	3:1	Station:	976+200.000
S.Level =	2130.43	B.C. =	2.50 Kg/cm²	S.Level =	2129.274
T.O.F. =	2122.43	Ave. Height =	7.42	T.O.F. =	2122.43
Height =	8	Based Height =	8.00	Height =	6.844

Quantity of Concrete

	Area	Legth	Volume
Wall	5.455	12.400	67.644
Found'n	6.270	12.400	77.748
Key			
		Total Volume =	**145.392**

Retaining Wall
STRIP NO. 804

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 805 **TYPE 2**

Station: 976+200.000	Slope = 3:1	Station: 976+212.500
S.Level = 2129.274	B.C. = 2.50 Kg/cm²	S.Level = 2128.35
T.O.F = 2121.274		T.O.F = 2121.274
Height = 8.00	Length = 12.50	Height = 7.08
	Based Height = 8	
	Ave. Height = 7.54	

Retaining Wall
STRIP NO. 805

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 805

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 805	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7	0.30 Ave= 2.95 Min= 2.49 Max= 3.41	24	20	3.25	0.00	3.25	53	172.144	2.470	425.196
	MK8	0.30 94764° Ave= 7.44 Min= 6.99 Max= 7.92	15	16	7.74	0.00	7.74	84	649.992	1.580	1026.987
	MK9	1.32 94764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	36	484.560	1.580	765.605
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	36	480.240	1.210	581.090
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12var.	Min= 2.30 Ave= 6.36 Max=10.42	15	12	6.36	0.00	6.36	10	63.605	0.888	56.481
										SUB TOTAL =	**14,974.101**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 805

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 805	MK12edge	12 / 1.15	15	12	13.15	0.00	13.15	2	26.308	0.888	23.361
										SUB TOTAL =	23.361
										TOTAL =	14,997.462

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	408.544
14	581.090
16	5136.694
18	
20	425.196
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	14,997.46

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 805 **TYPE 2**

Station: 976+200.000	Slope = 3:1	Station: 976+212.500
S.Level = 2129.274	B.C. = 2.50 Kg/cm²	S.Level = 2128.35
T.O.F. = 2121.274	Ave. Height = 7.54	T.O.F. = 2121.274
Height = 8	Based Height = 8.00	Height = 7.076

Quantity of Concrete

	Area	Legth	Volume
Wall	5.540	12.400	68.701
Found'n	6.270	12.400	77.748
Key			
		Total Volume =	**146.449**

Retaining Wall
STRIP NO. 805

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 806 **TYPE 2**

Station:	976+212.500	Slope =	3:1	Station:	976+225.000
S.Level =	2128.35	B.C. =	2.50 Kg/cm²	S.Level =	2127.426
T.O.F =	2120.35			T.O.F =	2120.35
Height =	8.00	Length =	12.50	Height =	7.076
		Based Height =	8		
		Ave. Height =	7.54		

Retaining Wall
STRIP NO. 806

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 806

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 806	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7	0.30 Ave= 2.95 Min= 2.49 Max= 3.41	24	20	3.25	0.00	3.25	53	172.144	2.470	425.196
	MK8	0.30 94764° Ave= 7.44 Min= 6.99 Max= 7.92	15	16	7.74	0.00	7.74	84	649.992	1.580	1026.987
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	36	484.560	1.580	765.605
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	36	480.240	1.210	581.090
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12var.	Min= 2.30 Ave= 6.36 Max=10.42	15	12	6.36	0.00	6.36	10	63.605	0.888	56.481
										SUB TOTAL =	**14,974.101**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 806

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 806	MK12edge	12 / 1.15	15	12	13.15	0.00	13.15	2	26.308	0.888	23.361
										SUB TOTAL =	23.361
										TOTAL =	14,997.462

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	408.544
14	581.090
16	5136.694
18	
20	425.196
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,997.46**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 806 **TYPE 2**

Station:	976+212.500	Slope =	3:1	Station:	976+225.000
S.Level =	2128.35	B.C. =	2.50 Kg/cm²	S.Level =	2127.426
T.O.F. =	2120.35	Ave. Height =	7.54	T.O.F. =	2120.35
Height =	8	Based Height =	8.00	Height =	7.076

Quantity of Concrete

	Area	Legth	Volume
Wall	5.540	12.400	68.701
Found'n	6.270	12.400	77.748
Key			
		Total Volume =	**146.449**

Retaining Wall

STRIP NO. 806

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 807 **TYPE 2**

Station:	976+225.000	Slope =	3:1	Station:	976+237.500
S.Level =	2127.426	B.C. =	2.50 Kg/cm²	S.Level =	2126.511
T.O.F =	2119.426			T.O.F =	2119.426
Height =	8.00	Length =	12.50	Height =	7.085
		Based Height =	8		
		Ave. Height =	7.54		

Retaining Wall
STRIP NO. 807

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 807

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 807	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7	0.30 Ave= 2.95 Min= 2.50 Max= 3.41	24	20	3.25	0.00	3.25	53	172.383	2.470	425.785
	MK8	0.30 94.764° Ave= 7.44 Min= 7.00 Max= 7.92	15	16	7.74	0.00	7.74	84	650.370	1.580	1027.585
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	36	484.560	1.580	765.605
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	36	480.240	1.210	581.090
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12var.	Min= 2.20 Ave= 6.30 Max=10.40	15	12	6.30	0.00	6.30	10	63.006	0.888	55.950
										SUB TOTAL =	**14,974.755**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 807

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 807	MK12edge	12 / 1.15	15	12	13.15	0.00	13.15	2	26.306	0.888	23.360
										SUB TOTAL =	**23.360**
										TOTAL =	**14,998.115**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	408.012
14	581.090
16	5137.291
18	
20	425.785
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,998.12**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 807 **TYPE 2**

Station:	976+225.000	Slope =	3:1	Station:	976+237.500
S.Level =	2127.426	B.C. =	2.50 Kg/cm²	S.Level =	2126.511
T.O.F. =	2119.426	Ave. Height =	7.54	T.O.F. =	2119.426
Height =	8	Based Height =	8.00	Height =	7.085

Quantity of Concrete

	Area	Legth	Volume
Wall	5.544	12.400	68.742
Found'n	6.270	12.400	77.748
Key			
		Total Volume =	**146.490**

Retaining Wall
STRIP NO. 807

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 808 **TYPE 2**

Station:	976+237.500	Slope =	3:1	Station:	976+250.000
S.Level =	2126.511	B.C. =	2.50 Kg/cm²	S.Level =	2125.595
T.O.F =	2118.511			T.O.F =	2118.511
Height =	8.00	Length =	12.50	Height =	7.084
		Based Height =	8		
		Ave. Height =	7.54		

Retaining Wall
STRIP NO. 808

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 808

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 808	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7 Min= 2.49	0.30 Ave= 2.95 Max= 3.41	24	20	3.25	0.00	3.25	53	172.356	2.470	425.719
	MK8 Min= 7.00	0.30 94.764° Ave= 7.44 Max= 7.92	15	16	7.74	0.00	7.74	84	650.328	1.580	1027.518
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	36	484.560	1.580	765.605
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	36	480.240	1.210	581.090
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	28	370.160	0.888	328.702
	MK12var.	Min= 2.21 Ave= 6.31 Max= 10.40	15	12	6.31	0.00	6.31	10	63.073	0.888	56.009
										SUB TOTAL =	**14,974.683**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD
Item : 50201 REINFORCED STEEL Grade 60
Retaining Wall

Page: 3 of 4
Drwg. No. _____

STRIP NO. 808

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 808	MK12edge	12 1.15	15	12	13.15	0.00	13.15	2	26.306	0.888	23.360
										SUB TOTAL =	**23.360**
										TOTAL =	**14,998.043**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	408.071
14	581.090
16	5137.225
18	
20	425.719
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,998.04**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : TAIF AL BAHA - ABHA ROAD — Page: 4 of 4

Item : 50202 REINFORCED CONCRETE Class 280/20 — Drwg. No. _____

Retaining Wall

STRIP NO. 808 **TYPE 2**

Station:	976+237.500	Slope =	3:1	Station:	976+250.000
S.Level =	2126.511	B.C. =	2.50 Kg/cm²	S.Level =	2125.595
T.O.F. =	2118.511	Ave. Height =	7.54	T.O.F. =	2118.511
Height =	8	Based Height =	8.00	Height =	7.084

Quantity of Concrete

	Area	Legth	Volume
Wall	5.543	12.400	68.738
Found'n	6.270	12.400	77.748
Key			
		Total Volume =	**146.486**

Retaining Wall
STRIP NO. 808

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 809 **TYPE 2**

Station: 976+250.000	Slope = 3:1	Station: 976+262.500
S.Level = 2125.595	B.C. = 2.50 Kg/cm²	S.Level = 2123.734
T.O.F = 2117.595		T.O.F = 2117.595
Height = 8.00	Length = 12.50	Height = 6.139
	Based Height = 8	
	Ave. Height = 7.07	

Retaining Wall
STRIP NO. 809

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 809

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 809	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7	0.30 Ave= 2.48 Min= 1.55 Max= 3.41	24	20	2.78	0.00	2.78	53	147.314	2.470	363.864
	MK8	0.30 94.764° Ave= 6.97 Min= 6.05 Max= 7.92	15	16	7.27	0.00	7.27	84	610.638	1.580	964.808
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	34	457.640	1.580	723.071
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	34	453.560	1.210	548.808
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	20	264.400	0.888	234.787
	MK12var.	Min= 0.36 Ave= 5.90 Max=11.44	15	12	5.90	0.00	5.90	24	141.538	0.888	125.685
										SUB TOTAL =	**14,751.063**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 809

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 809	MK12edge	12 / 1.26	15	12	13.26	0.00	13.26	2	26.513	0.888	23.544
										SUB TOTAL =	23.544
										TOTAL =	14,774.607

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	384.016
14	548.808
16	5031.981
18	
20	363.864
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,774.61**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 809 **TYPE 2**

Station:	976+250.000	Slope =	3:1	Station:	976+262.500
S.Level =	2125.595	B.C. =	2.50 Kg/cm²	S.Level =	2123.734
T.O.F. =	2117.595	Ave. Height =	7.07	T.O.F. =	2117.595
Height =	8	Based Height =	8.00	Height =	6.139

Quantity of Concrete			
	Area	Legth	Volume
Wall	5.196	12.400	64.431
Found'n	6.270	12.400	77.748
Key			
		Total Volume =	**142.179**

Retaining Wall
STRIP NO. 809

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 810 **TYPE 2**

Station: 976+262.500	Slope = 3:1	Station: 976+275.000
S.Level = 2123.734	B.C. = 2.50 Kg/cm²	S.Level = 2121.872
T.O.F = 2115.872		T.O.F = 2115.872
Height = 7.86	Length = 12.50	Height = 6.00
	Based Height = 7.862	
	Ave. Height = 6.93	

Retaining Wall
STRIP NO. 810

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 810

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.00	0.40	1.07	1.70	3.50	1.00	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 810	MK1	0.90 6.17	12.50	16	7.07	0.00	7.07	100	707.000	1.580	1117.060
	MK2	6.17 0.90	12.50	32	7.07	0.00	7.07	100	707.000	6.313	4463.291
	MK3 O.L=60xØ	X = 0.90 11.10 2.26	15	16	15.16	0.00	15.16	84	1273.440	1.580	2012.035
	MK4	2.22 0.40	16	25	2.62	0.00	2.62	79	206.980	3.854	797.701
	MK5	4.32 0.40	24	25	4.72	0.00	4.72	53	250.160	3.854	964.117
	MK6	6.86	15	25	6.86	0.00	6.86	84	576.240	3.854	2220.829
	MK7 Min= 1.41	0.30 Ave= 2.34 Max= 3.27	24	20	2.64	0.00	2.64	53	139.973	2.470	345.733
	MK8 Min= 5.91	0.30 94.764° Ave= 6.83 Max= 7.78	15	16	7.13	0.00	7.13	84	599.004	1.580	946.426
	MK9	1.32 94.764° 0.30	15	16	1.62	0.00	1.62	84	136.080	1.580	215.006
	MK10 O.L=60xØ	12.00 1.46	15	16	13.46	0.00	13.46	32	430.720	1.580	680.538
	MK11 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	32	426.880	1.210	516.525
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	20	264.400	0.888	234.787
	MK12var.	Min= 0.36 Ave= 5.90 Max=11.44	15	12	5.90	0.00	5.90	24	141.622	0.888	125.760
										SUB TOTAL =	**14,639.809**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 810

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	8.000	0.400	1.070	1.700	3.500	1.000	

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 810	MK12edge	12 1.26	15	12	13.26	0.00	13.26	2	26.514	0.888	23.544
										SUB TOTAL =	**23.544**
										TOTAL =	**14,663.353**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	384.092
14	516.525
16	4971.066
18	
20	345.733
22	
25	3982.647
28	
30	
32	4463.291
36	
TOTAL =	**14,663.35**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 810 **TYPE 2**

Station: 976+262.500	Slope = 3:1	Station: 976+275.000
S.Level = 2123.734	B.C. = 2.50 Kg/cm²	S.Level = 2121.872
T.O.F. = 2115.872	Ave. Height = 6.93	T.O.F. = 2115.872
Height = 7.862	Based Height = 7.86	Height = 6

Quantity of Concrete			
	Area	Legth	Volume
Wall	5.094	12.450	63.424
Found'n	6.270	12.450	78.062
Key			
		Total Volume =	**141.485**

Retaining Wall
STRIP NO. 810

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

(BEARING CAPACITY = 4.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
9.00	0.40	1.30	2.20	4.00	1.20	1.90	#20 @ 11 L = 5.20	#32 @ 11 L = 8.80	#16 @ 15	#32 @ 16 L = 5.57	#25 @ 19 L = 3.17	#32 @ 16 L = 8.37	#28 @ 24 L = 4.86	#16 @ 15 L = 8.50	#16 @ 15 L = 2.12	#16 @ 15	#16 @ 15	#14 @ 15	#16 @ 16 L = 4.40	20.71	1903.84
8.00	0.40	1.20	1.60	3.50	1.20	1.80	#16 @ 10 L = 7.60	#32 @ 10 L = 7.60	#16 @ 15	#28 @ 16 L = 4.75	#22 @ 18 L = 4.40	#28 @ 18 L = 7.20	#22 @ 24 L = 3.69	#16 @ 15 L = 8.50	#16 @ 15 L = 1.82	#16 @ 15	#14 @ 15	#12 @ 15	#16 @ 16 L = 3.80	16.78	1446.20
7.00	0.40	1.10	1.40	3.20	1.00	1.30	#16#12.5 L = 6.80	#32#12.5 L = 6.80	#16 @ 15	#28 @ 16 L = 3.92	#20 @ 18 L = 3.59	#25 @ 19 L = 6.19	#22 @ 27 L = 3.56	#16 @ 15 L = 7.80	#16 @ 15 L = 1.62	#16 @ 15	#14 @ 15	#12 @ 15	#16 @ 18 L = 3.60	12.06	1018.79
6.00	0.30	0.90	1.10	2.80	0.80	1.00	#16 @ 16 L = 5.40	#32#12.5 L = 5.40	#16 @ 15	#28 @ 20 L = 3.42	#18 @ 20 L = 3.27	#25 @ 20 L = 5.52	#22 @ 30 L = 3.23	#16 @ 15 L = 6.40	#16 @ 15 L = 1.42	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 20 L = 3.00	8.19	806.40
5.00	0.30	0.80	1.00	2.30	0.70	0.70	#14 @ 18 L = 4.80	#25 @ 18 L = 4.60	#14 @ 15	#20 @ 18 L = 3.02	-	#25 @ 18 L = 4.89	#16 @ 32 L = 2.95	#16 @ 18 L = 5.40	#16 @ 18 L = 1.32	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 18 L = 2.80	6.11	602.80
4.00	0.30	0.70	0.80	1.90	0.50	0.40	#14 @ 18 L = 3.80	#25 @ 18 L = 3.80	#14 @ 15	#20 @ 18 L = 2.68	-	#20 @ 18 L = 3.71	#16 @ 32 L = 2.06	#16 @ 20 L = 4.40	#16 @ 20 L = 1.12	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 18 L = 2.10	3.86	371.10
3.00	0.25	0.55	0.50	1.40	0.50	0.00	#16 @ 15 L = 2.75	#16 @ 15 L = 2.75	#14 @ 15	#16 @ 15 L = 1.24	-	#16 @ 18 L = 2.74	#16 @ 36 L = 1.74	#16 @ 20 L = 3.35	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	-	2.43	179.00

(BEARING CAPACITY = 3.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
9.00	0.40	1.20	2.20	4.00	1.20	1.90	#18 @ 8 L = 5.60	#32 @ 8 L = 8.60	#16 @ 15	#30 @ 16 L = 5.21	#25 @ 18 L = 3.40	#30 @ 16 L = 8.11	#28 @ 24 L = 4.86	#16 @ 15 L = 8.50	#16 @ 15 L = 1.82	#16 @ 15	#16 @ 15	#14 @ 15	#16 @ 16 L = 4.10	20.41	2188.90
8.00	0.40	1.20	1.60	4.00	1.10	1.80	#16 @ 10 L = 7.60	#32 @ 10 L = 7.60	#16 @ 15	#28 @ 16 L = 4.86	#22 @ 18 L = 4.44	#28 @ 18 L = 7.20	#22 @ 24 L = 3.69	#16 @ 15 L = 8.50	#16 @ 15 L = 1.72	#16 @ 15	#14 @ 15	#12 @ 15	#16 @ 16 L = 3.70	15.54	1508.10
7.00	0.40	1.10	1.50	3.30	1.00	1.30	#16#12.5 L = 6.70	#32#12.5 L = 6.70	#16 @ 15	#28 @ 18 L = 3.92	#20 @ 18 L = 3.65	#25 @ 18 L = 6.19	#22 @ 27 L = 3.56	#16 @ 15 L = 7.80	#16 @ 15 L = 1.62	#16 @ 15	#14 @ 15	#12 @ 15	#16 @ 18 L = 3.30	12.28	1058.80
6.00	0.30	0.90	1.10	2.80	0.80	1.00	#16 @ 10 L = 5.40	#30 @ 12 L = 5.40	#16 @ 15	#28 @ 20 L = 3.42	#18 @ 20 L = 3.27	#25 @ 20 L = 5.52	#22 @ 30 L = 3.23	#16 @ 15 L = 6.40	#16 @ 15 L = 1.42	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 20 L = 2.80	8.19	785.80
5.00	0.30	0.80	1.00	2.30	0.70	0.70	#14 @ 18 L = 4.80	#25 @ 18 L = 4.60	#16 @ 15	#20 @ 18 L = 3.02	-	#25 @ 18 L = 4.89	#16 @ 32 L = 2.95	#16 @ 18 L = 5.40	#16 @ 18 L = 1.32	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 18 L = 2.40	6.11	604.10
4.00	0.30	0.70	0.80	1.90	0.50	0.40	#14 @ 18 L = 3.80	#25 @ 18 L = 3.80	#14 @ 15	#20 @ 18 L = 2.68	-	#20 @ 18 L = 3.71	#16 @ 32 L = 2.06	#16 @ 20 L = 4.40	#16 @ 20 L = 1.12	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 18 L = 1.90	3.86	371.11
3.00	0.25	0.55	0.50	1.40	0.50	0.00	#14 @ 18 L = 2.75	#16 @ 14 L = 2.75	#14 @ 15	#16 @ 15 L = 1.24	-	#16 @ 18 L = 2.74	#16 @ 36 L = 1.74	#16 @ 20 L = 3.35	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	-	2.43	197.00

(BEARING CAPACITY = 2.50 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
9.00	0.40	1.30	2.70	5.20	1.30	1.80	#22 @ 10 L = 10.30	#32 @ 8 L = 10.30	#16 @ 15	#30 @ 16 L = 5.21	#25 @ 18 L = 3.40	#30 @ 16 L = 8.11	#28 @ 24 L = 4.86	#16 @ 15 L = 8.50	#16 @ 15 L = 1.82	#16 @ 15	#16 @ 15	#14 @ 15	#16 @ 16 L =4.00	21.33	2291.74
8.00	0.40	1.20	2.20	4.50	1.10	1.80	#20 @ 10 L = 8.40	#30 @ 10 L = 8.40	#16 @ 15	#28 @ 16 L = 4.86	#22 @ 18 L = 4.44	#28 @ 18 L = 7.20	#22 @ 24 L = 3.69	#16 @ 15 L = 8.50	#16 @ 15 L = 1.72	#16 @ 15	#14 @ 15	#12 @ 15	#16 @ 16 L = 3.60	16.00	1631.20
7.00	0.40	1.10	1.70	3.50	1.00	1.20	#18 @ 11 L = 7.10	#30 @ 11 L = 7.10	#16 @ 15	#28 @ 16 L = 3.92	#20 @ 18 L = 3.59	#25 @ 18 L = 6.19	#22 @ 27 L = 3.56	#16 @ 15 L = 7.80	#16 @ 15 L = 1.62	#16 @ 15	#14 @ 15	#12 @ 15	#16 @ 18 L = 3.20	12.57	1078.84
6.00	0.30	0.80	1.30	2.80	0.80	1.00	#16#12.5 L = 5.60	#30#12.5 L = 5.60	#16 @ 15	#28 @ 20 L = 3.42	#18 @ 20 L = 3.27	#25 @ 20 L = 5.52	#22 @ 30 L = 3.23	#16 @ 15 L = 6.40	#16 @ 15 L = 1.42	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 20 L = 2.80	8.38	804.92
5.00	0.30	0.80	1.00	2.30	0.70	0.70	#14 @ 18 L = 4.80	#25 @ 18 L = 4.60	#14 @ 15	#20 @ 18 L = 3.02	-	#25 @ 18 L = 4.89	#16 @ 32 L = 2.95	#16 @ 18 L = 5.40	#16 @ 18 L = 1.32	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 18 L = 2.40	6.11	553.55
4.00	0.30	0.70	0.70	1.80	0.50	0.40	#14 @ 18 L = 3.80	#25 @ 18 L = 3.80	#14 @ 15	#20 @ 18 L = 2.68	-	#20 @ 18 L = 3.71	#16 @ 32 L = 2.06	#16 @ 20 L = 4.40	#16 @ 20 L = 1.12	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 18 L = 1.80	3.88	357.10
3.00	0.25	0.55	0.50	1.40	0.50	0.00	#14 @ 18 L = 2.60	#16 @ 14 L = 2.60	#14 @ 15	#16 @ 15 L = 1.24	-	#16 @ 18 L = 2.74	#16 @ 36 L = 1.66	#16 @ 20 L = 3.35	#16 @ 20 L = 1.02	#12 @ 15	#12 @ 15	#12 @ 15	-	2.43	166.90

(BEARING CAPACITY = 2.00 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
8.00	0.40	1.20	2.60	4.80	0.80	1.90	#22 @ 8 L = 8.05	#32 @ 8 L = 8.05	#16 @ 15	#32 @ 16 L = 4.86	#22 @ 18 L = 4.42	#30 @ 16 L = 7.44	#28 @ 27 L = 4.18	#16 @ 15 L = 8.50	#16 @ 15 L = 1.57	#16 @ 15	#14 @ 15	#12 @ 16	#16 @ 16 L = 3.40	15.54	1822.78
7.00	0.40	1.10	2.10	3.80	0.80	1.20	#16 @ 10 L = 7.70	#28 @ 10 L = 7.70	#16 @ 15	#28 @ 18 L = 3.72	#20 @ 18 L = 3.84	#25 @ 18 L = 6.19	#22 @ 27 L = 3.56	#16 @ 15 L = 7.80	#16 @ 15 L = 1.52	#16 @ 15	#14 @ 15	#12 @ 15	#16 @ 15 L = 3.10	12.57	1155.24
6.00	0.30	0.80	1.90	3.00	0.70	1.00	#16#12.5 L = 5.90	#32#12.5 L = 5.90	#16 @ 15	#28 @ 20 L = 3.42	#18 @ 20 L = 3.28	#25 @ 20 L = 5.52	#22 @ 30 L = 3.23	#16 @ 15 L = 6.40	#16 @ 15 L = 1.32	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 20 L = 2.70	8.13	582.40
5.00	0.30	0.80	1.10	2.40	0.70	0.70	#14 @ 18 L = 4.80	#25 @ 18 L = 4.60	#14 @ 15	#20 @ 18 L = 3.02	-	#25 @ 18 L = 4.89	#16 @ 32 L = 2.95	#16 @ 18 L = 5.40	#16 @ 18 L = 1.32	#14 @ 15	#14 @ 15	#12 @ 16	#16 @ 18 L = 2.40	6.28	598.20
4.00	0.30	0.70	0.70	1.80	0.50	0.40	#14 @ 18 L = 3.80	#25 @ 18 L = 3.80	#14 @ 15	#20 @ 18 L = 2.68	-	#20 @ 18 L = 3.71	#16 @ 32 L = 2.06	#16 @ 20 L = 4.40	#16 @ 20 L = 1.12	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 18 L = 1.80	3.86	357.10
3.00	0.25	0.55	0.50	1.30	0.50	0.00	#14 @ 18 L = 2.75	#16 @ 15 L = 2.75	#14 @ 15	#16 @ 15 L = 1.24	-	#16 @ 18 L = 2.74	#14 @ 32 L = 1.62	#16 @ 20 L = 3.35	#16 @ 20 L = 1.12	#12 @ 10	#12 @ 10	#12 @ 15	-	2.43	189.72

(BEARING CAPACITY = 1.50 kg/cm²)

DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALLS													QUANTITIES / m	
Hw	Ttop	Tbot.	TOE	HEEL	Tf	Tk	MK1	MK2	MK3	MK4	MK5	MK6	MK7	MK8	MK9	MK10	MK11	MK12	MK13	CONC. m³	STEEL kg.
7.00	0.30	1.00	2.60	4.80	0.80	1.00	#22 @ 10 L = 8.00	#32 @ 10 L = 8.00	#16 @ 15	#28 @ 18 L = 3.76	#20 @ 18 L = 3.83	#25 @ 18 L = 6.83	#28 @ 27 L = 3.63	#16 @ 15 L = 7.40	#16 @ 15 L = 1.42	#16 @ 15	#14 @ 15	#12 @ 15	#16 @ 16 L = 2.80	12.07	1589.84
6.00	0.30	0.80	1.80	3.80	0.70	0.80	#18 @ 10 L = 7.10	#28 @ 10 L = 7.10	#16 @ 15	#28 @ 18 L = 3.12	#18 @ 20 L = 3.28	#25 @ 20 L = 5.52	#22 @ 30 L = 3.23	#16 @ 15 L = 6.40	#16 @ 15 L = 1.32	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 20 L = 2.50	8.52	894.80
5.00	0.30	0.80	1.30	2.80	0.60	0.80	#16#12.5 L = 6.30	#28#12.5 L = 6.30	#16 @ 15	#28 @ 16 L = 2.72	-	#25 @ 18 L = 4.86	#16 @ 32 L = 2.95	#16 @ 18 L = 5.40	#16 @ 18 L = 1.22	#14 @ 15	#12 @ 15	#12 @ 15	#16 @ 16 L = 2.10	6.04	666.14
4.00	0.25	0.65	0.80	2.00	0.50	0.40	#14 @ 15 L = 3.85	#28 @ 15 L = 3.85	#14 @ 15	#20 @ 16 L = 2.03	-	#20 @ 16 L = 3.71	#16 @ 32 L = 2.06	#16 @ 20 L = 4.40	#16 @ 20 L = 1.12	#12 @ 15	#12 @ 15	#12 @ 15	#14 @ 16 L = 1.60	3.83	369.06
3.00	0.25	0.50	0.50	1.30	0.40	0.50	#14 @ 15 L = 2.60	#16 @ 15 L = 2.60	#14 @ 15	#16 @ 15 L = 1.34	-	#16 @ 18 L = 2.74	#14 @ 32 L = 1.62	#16 @ 20 L = 3.35	#16 @ 20 L = 1.02	#12 @ 15	#12 @ 15	#12 @ 15	-	2.09	164.06

TYP. ELEVATON OF WALL PANEL
(SHOWING DIMENSIONS)

CROSS SECTION
(DIMENSIONS)

TYP. ELEVATON OF WALL PANEL
(SHOWING REINFORCEMENT)

CROSS SECTION
(REINFORCEMENT)

NOTE :

FOR GENERAL NOTES, SEE DRWG. No. ST/RW/01

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة المواصلات
MINISTRY OF COMMUNICATIONS
ادارة التصميم
DESIGN DEPARTMENT

إصلاح الجزء السفلي من عقبة ضلع (المرحلة الثانية)

THE SAUDI ENGINEER
Consulting Engineers & Architects
P.O.Box: 8341 Riyadh Tel : 4764667

المهندس السعودي
مهندسون استشاريون ومعماريون
ص . ب : ٨٣٤١ الرياض هـ : ٤٧٦٤٦٦٧

Title: عنوان المخطط : STANDARD OF RETAINING WALL TYPE – 3 (back slope 1:2)			MOC Approval موافقة الوزارة
DRWS.N: ST/RW/03	DATE: 01/1415 05/1994	SCALE: 1:100	STAMP:
Drawn: NJD	Designed: NSS	Checked: NSS	Approved: ASA	Date:

040115 / 130694
64DRWL3 / nelson

Ministry TYPE 3

BEARING CAPACITY =4.00 Kg/cm² (Type 3)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
9.00	0.40	1.30	2.20	4.00	1.50	1.90	Ø20 @11 L=8.80	Ø32@11 L=8.80	Ø16 @ 15	Ø32 @16 L=5.87	Ø25 @16 L=5.17	Ø32 @16 L=8.37	Ø28 @ 24 L=4.86	Ø16 @ 15 L=9.50	Ø16 @ 15 L=2.12	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15	Ø16 @ 16 L=4.40	20.71	1903.54
8.00	0.40	1.20	1.60	3.80	1.20	1.60	Ø16 @10 L=7.60	Ø32 @10 L=7.60	Ø16 @ 15	Ø28 @16 L=4.76	Ø22 @ 16 L= 4.45	Ø28 @16 L=7.20	Ø22 @ 24 L=3.89	Ø16 @ 15 L=8.50	Ø16 @ 15 L=1.82	Ø18 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16 L=3.80	15.76	1448.20
7.00	0.40	1.10	1.40	3.20	1.00	1.30	Ø16 @12.5 L=6.50	Ø32 @12.5 L=6.50	Ø16 @ 15	Ø25 @18 L=3.92	Ø20 @ 18 L=3.85	Ø25 @18 L=6.19	Ø22 @ 27 L=3.56	Ø16 @ 15 L=7.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16 L=3.50	12.06	1019.70
6.00	3.00	0.90	1.10	2.80	0.80	1.00	Ø16 @15 L=5.40	Ø32 @12.5 L=5.40	Ø16 @ 15	Ø25 @20 L=3.42	Ø18 @20 L=3.27	Ø25 @ 20 L=5.52	Ø22 @ 30 L=3.23	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.42	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 20 L=3.00	8.19	806.40
5.00	0.30	0.80	1.00	2.30	0.70	0.70	Ø14 @15 L=4.60	Ø28 @15 L=4.60	Ø14 @15	Ø25 @16 L=3.02		Ø25 @16 L=4.86	Ø18 @ 32 L=2.55	Ø16 @ 15 L=5.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 16 L=2.60	9.11	602.80
4.00	0.30	0.70	0.60	1.90	0.50	0.40	Ø14 @16 L=3.50	Ø28 @16 L=3.50	Ø14 @15	Ø20 @16 L=2.05		Ø20 @16 L=3.71	Ø16 @ 32 L=2.08	Ø16 @ 20 L=4.40	Ø16 @ 20 L=1.12	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 16 L=2.10	3.86	371.10
3.00	0.25	0.55	0.50	1.40	0.50	0.00	Ø16 @15 L=2.75	Ø18 @15 L=2.75	Ø14 @15	Ø16 @18 L=1.34		Ø16 @ 18 L=2.74	Ø16 @ 36 L=1.74	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.43	179.00

BEARING CAPACITY =3.00 Kg/cm² (Type 3)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
9.00	0.40	1.30	2.30	4.90	1.30	1.80	Ø18 @ 8 L=9.60	Ø32 @ 8 L=9.60	Ø16 @15	Ø30 @ 16 L=5.31	Ø28 @ 16 L=5.40	Ø30 @ 16 L=8.11	Ø28 @ 24 L=4.80	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.92	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15	Ø16 @ 16 L=4.10	20.41	2158.80
8.00	0.40	1.20	1.80	4.00	1.10	1.60	Ø18 @10 L=7.90	Ø32 @10 L=7.90	Ø16 @15	Ø28 @16 L=4.66	Ø22 @ 16 L=4.44	Ø28 @16 L=7.20	Ø22 @ 24 L=3.89	Ø16 @ 15 L=8.50	Ø16 @ 15 L=1.72	Ø18 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16 L=3.70	15.54	1508.10
7.00	0.40	1.10	1.50	3.30	1.00	1.30	Ø18 @12.5 L=6.70	Ø32 @12.5 L=6.70	Ø16 @15	Ø25 @18 L=3.92	Ø20 @ 18 L=3.85	Ø25 @18 L=6.19	Ø22 @27 L=3.56	Ø16 @ 15 L=7.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 18 L=3.30	12.26	1058.90
6.00	0.30	0.90	1.10	2.80	0.80	1.00	Ø16 @15 L=5.40	Ø30 @12 L=5.40	Ø16 @15	Ø25 @ 20 L=3.42	Ø18 @ 20 L=3.27	Ø25 @ 20 L=5.52	Ø22 @ 30 L=3.23	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.42	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 20 L=2.80	8.19	785.50
5.00	0.30	0.80	1.00	2.50	0.70	0.70	Ø14 @15 L=4.60	Ø28 @15 L=4.00	Ø16 @15	Ø25 @16 L=3.02		Ø25 @16 L=4.86	Ø18 @32 L=2.55	Ø16 @20 L=5.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 16 L=2.40	6.11	604.10
4.00	0.30	0.70	0.60	1.90	0.50	0.40	Ø14 @15 L=3.50	Ø28 @16 L=3.50	Ø14 @15	Ø20 @16 L=2.05		Ø20 @16 L=3.71	Ø16 @ 32 L=2.05	Ø16 @ 20 L=4.40	Ø16 @ 20 L=1.12	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 16 L=1.90	3.86	371.11
3.00	0.25	0.55	0.50	1.40	0.50	0.00	Ø14 @15 L=2.75	Ø16 @14 L=2.75	Ø14 @15	Ø16 @ 15 L=1.34		Ø16 @18 L=2.74	Ø16 @ 36 L=1.74	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.43	197.00

BEARING CAPACITY =2.50 Kg/cm² (Type3)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
9.00	0.40	1.30	2.70	5.20	1.30	1.80	Ø22 @ 10 L=10.30	Ø32 @ 8 L=10.30	Ø16 @15	Ø30 @ 16 L=5.21	Ø22 @ 16 L=5.49	Ø30 @ 16 L=8.11	Ø28 @ 24 L=4.86	Ø16 @ 15 L=9.50	Ø16 @ 15 L=1.92	Ø18 @ 15	Ø16 @ 15	Ø14 @ 15	Ø16 @ 16 L=4.00	21.23	2291.74
8.00	0.40	1.20	2.30	4.00	1.10	1.50	Ø20 @10 L=8.40	Ø32 @10 L=8.40	Ø16 @15	Ø28 @16 L=4.56	Ø22 @ 16 L=4.44	Ø28 @16 L=7.20	Ø22 @24 L=3.89	Ø16 @ 15 L=8.50	Ø16 @ 15 L=1.72	Ø18 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16 L=3.60	16.00	1531.20
7.00	0.40	1.10	1.70	3.50	1.00	1.20	Ø16 @11 L=7.10	Ø30 @11 L=7.10	Ø16 @15	Ø25 @16 L=3.82	Ø20 @ 18 L=3.85	Ø25 @18 L=6.19	Ø22 @ 27 L=3.56	Ø16 @ 15 L=7.50	Ø16 @ 15 L=1.62	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 18 L=3.20	12.57	1078.84
6.00	0.30	0.90	1.30	2.80	0.80	1.00	Ø16 @12.5 L=5.60	Ø30 @12.5 L=5.60	Ø16 @15	Ø25 @ 20 L=3.42	Ø18 @ 20 L=3.27	Ø25 @ 20 L=5.52	Ø22 @ 30 L=3.23	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.42	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 20 L=2.80	8.35	804.92
5.00	0.30	0.80	1.00	2.30	0.70	0.70	Ø14 @15 L=4.60	Ø22 @15 L=4.60	Ø14 @15	Ø25 @16 L=3.02		Ø25 @16 L=4.86	Ø18 @32 L=2.55	Ø16 @ 15 L=5.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 16 L=2.40	6.11	583.88
4.00	0.30	0.70	0.70	1.80	0.50	0.40	Ø14 @15 L=3.50	Ø25 @15 L=3.50	Ø14 @15	Ø20 @16 L=2.05		Ø20 @16 L=3.71	Ø16 @ 32 L=2.08	Ø16 @ 20 L=4.40	Ø16 @ 20 L=1.12	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 16 L=1.90	3.86	357.10
3.00	0.25	0.55	0.50	1.40	0.50	0.00	Ø14 @15 L=2.80	Ø16 @14 L=2.60	Ø14 @15	Ø16 @18 L=1.24		Ø16 @18 L=2.74	Ø16 @ 36 L=1.62	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.43	188.90

BEARING CAPACITY =2.00 Kg/cm² (Type 3)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
8.00	0.40	1.20	2.60	4.50	0.95	1.50	Ø22 @ 9.0 L=9.05	Ø32 @ 9.0 L=9.05	Ø16 @15	Ø30 @18 L=4.66	Ø22 @ 18 L=4.42	Ø30 @18 L=7.44	Ø25 @27 L=4.19	Ø16 @ 15 L=8.50	Ø16 @ 15 L=1.57	Ø18 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 18 L=3.45	15.64	1822.26
7.00	0.40	1.10	2.10	3.80	0.90	1.20	Ø18 @10 L=7.70	Ø28 @10 L=7.70	Ø16 @15	Ø25 @18 L=3.72	Ø20 @ 18 L=3.84	Ø25 @18 L=6.19	Ø22 @27 L=3.56	Ø16 @ 15 L=7.50	Ø16 @ 15 L=1.52	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 18 L=3.10	12.57	1155.24
6.00	0.30	0.90	1.50	3.00	0.70	1.00	Ø18 @ 12.5 L=5.90	Ø32 @12.5 L=5.90	Ø16 @15	Ø25 @ 20 L=3.32	Ø18 @ 20 L=3.26	Ø25 @20 L=5.52	Ø22 @ 30 L=3.23	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 20 L=2.70	8.13	882.40
5.00	0.30	0.80	1.10	2.40	0.70	0.70	Ø14 @15 L=4.80	Ø28 @15 L=4.80	Ø14 @15	Ø25 @16 L=3.02		Ø25 @16 L=4.86	Ø18 @32 L=2.55	Ø16 @15 L=5.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 16 L=2.40	6.25	595.20
4.00	0.30	0.70	0.70	1.80	0.50	0.40	Ø14 @15 L=3.50	Ø25 @15 L=3.50	Ø14 @15	Ø20 @16 L=2.05		Ø20 @16 L=3.71	Ø16 @ 32 L=2.08	Ø16 @ 20 L=4.40	Ø16 @ 20 L=1.12	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 16 L=1.90	3.86	357.10
3.00	0.25	0.55	0.60	1.30	0.50	0.00	Ø14 @15 L=2.75	Ø16 @15 L=2.75	Ø14 @15	Ø16 @16 L=1.34		Ø16 @16 L=2.74	Ø14 @ 32 L=1.62	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.43	189.72

BEARING CAPACITY =1.50 Kg/cm² (Type 3)																					
DIMENSIONS OF RETAINING WALLS							REINFORCEMENT OF RETAINING WALL													QUANTITIES / m	
Hw	T top	T bot.	TOE	HEEL	Tf	Tk	MK 1	MK 2	MK 3	MK 4	MK 5	MK 6	MK 7	MK 8	MK 9	MK 10	MK 11	MK 12	MK 13	Concrete m³	Steel (Kg)
7.00	0.30	1.00	2.60	4.80	0.80	1.00	Ø22 @ 10 L=9.00	Ø32 @10 L=9.00	Ø16 @15	Ø28 @18 L=5.76	Ø20 @18 L=3.83	Ø28 @18 L=6.53	Ø28 @27 L=3.83	Ø16 @ 15 L=7.40	Ø16 @ 15 L=1.42	Ø16 @ 15	Ø14 @ 15	Ø12 @ 15	Ø16 @ 18 L=2.80	12.07	1569.84
6.00	0.30	0.90	1.90	3.80	0.70	0.50	Ø18 @10 L=7.10	Ø28 @10 L=7.10	Ø16 @15	Ø25 @20 L=3.12	Ø18 @ 20 L=3.26	Ø25 @20 L=5.52	Ø22 @30 L=3.23	Ø16 @ 15 L=6.40	Ø16 @ 15 L=1.32	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 20 L=2.50	8.82	994.80
5.00	0.30	0.80	1.30	2.80	0.60	0.50	Ø16 @12.5 L=5.30	Ø28 @12.5 L=5.30	Ø16 @15	Ø25 @16 L=2.72		Ø25 @16 L=4.86	Ø18 @32 L=2.55	Ø16 @15 L=5.40	Ø16 @ 15 L=1.22	Ø14 @ 15	Ø12 @ 15	Ø12 @ 15	Ø16 @ 16 L=2.10	6.04	696.14
4.00	0.25	0.65	0.90	2.00	0.50	0.40	Ø14 @15 L=3.85	Ø25 @15 L=3.85	Ø14 @15	Ø20 @16 L=2.05		Ø20 @16 L=3.71	Ø16 @ 32 L=2.08	Ø16 @ 20 L=4.35	Ø16 @ 20 L=1.12	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15	Ø14 @ 16 L=1.90	3.83	366.86
3.00	0.25	0.50	0.60	1.30	0.40	0.00	Ø14 @15 L=2.60	Ø18 @15 L=2.60	Ø14 @15	Ø16 @15 L=1.24		Ø16 @15 L=2.74	Ø14 @ 30 L=1.62	Ø16 @ 20 L=3.35	Ø16 @ 20 L=1.02	Ø12 @ 15	Ø12 @ 15	Ø12 @ 15		2.09	194.06

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 1 of 1

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

From: Sta.974+675 to Sta.974+750

TOTAL WEIGHT OF STEEL PER BAR DIAMETER

STRIP NO. 501 to 403

TYPE 3

Length = 75.000 m.

S U M M A R Y

BAR SIZE (mm)	WEIGHT (kg)
8	0.000
10	0.000
12	3358.312
14	9726.900
16	6370.196
18	0.000
20	3447.799
22	0.000
25	15384.628
28	0.000
30	0.000
32	0.000
36	0.000
TOTAL =	**38,287.83**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : TAIF AL BAHA - ABHA ROAD — Page: 1 of 1

Item : 50202 REINFORCED CONCRETE Class 280/20 — Drwg. No. _____

Retaining Wall

From: Sta.974+675 to Sta.974+750

TOTAL VOLUME OF CONCRETE PER STRIP

STRIP NO. 501 to 403

TYPE 3

Length = 75.000 m.

S U M M A R Y

LOCATION	VOLUME (m³)
STRIP NO. 501	77.374
STRIP NO. 502	75.263
STRIP NO. 503	73.462
STRIP NO. 401	51.572
STRIP NO. 402	51.572
STRIP NO. 403	48.175
TOTAL =	**377.42**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 501 **TYPE 3**

Station: 974+675.000	Slope = 2:1	Station: 974+687.500
S.Level = 2211.682	B.C. = 2.50 Kg/cm²	S.Level = 2211.429
T.O.F = 2206.682		T.O.F = 2206.682
Height = 5	Length = 12.50	Height = 4.747
	Based Height = 5	
	Ave. Height = 4.87	

STRIP NO. 501

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 501

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.00	0.30	0.85	1.00	2.30	0.70	0.70

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 501	MK1	0.60 4.05	15	14	4.65	0.00	4.65	84	390.600	1.210	472.626
	MK2	4.05 0.60	15	25	4.65	0.00	4.65	84	390.600	3.854	1505.372
	MK3 O.L=60xØ	X = 0.60 11.40 1.84	15	14	14.44	0.00	14.44	56	808.640	1.210	978.454
	MK4	1.31 0.61 0.40 0.70	15	25	3.02	0.00	3.02	84	253.680	3.854	977.683
	MK5	0.00 0.00			0.00	0.00	0.00	0	0.000		0.000
	MK6	4.86	16	25	4.86	0.00	4.86	79	383.940	3.854	1479.705
	MK7	0.20 Ave= 2.52 Min= 2.40 Max= 2.65	32	16	2.72	0.00	2.72	40	108.940	1.580	172.125
	MK8	0.20 95.71° Ave= 4.77 Min= 4.67 Max= 4.92	15	16	4.97	0.00	4.97	84	417.774	1.580	660.083
	MK9	1.02 95.71° 0.30	15	16	1.32	0.00	1.32	84	110.880	1.580	175.190
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	24	320.160	1.210	387.394
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	24	317.280	0.888	281.745
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	22	290.840	0.888	258.266
	MK12var.	Min= 0.00 Ave= 5.76 Max= 5.76	15	12	5.76	0.00	5.76	2	11.517	0.888	10.227
										SUB TOTAL =	**7,358.870**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 501

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.000	0.300	0.850	1.000	2.300	0.700	0.700

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 501	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.245	0.888	23.306
	MK13	0.50 / 1.40 / 0.50	15	16	2.40	0.00	2.40	84	201.600	1.580	318.528
	TRW DOWEL	0.74 / 0.30	30	16	1.04	0.00	1.04	42	44.027	1.580	69.562
										SUB TOTAL =	**411.396**
										TOTAL =	**7,770.266**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	643.105
14	1838.474
16	1325.927
18	
20	
22	
25	3962.760
28	
30	
32	
36	
TOTAL =	**7,770.266**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 501 **TYPE 3**

Station:	974+675.000	Slope =	2:1	Station:	974+687.500
S.Level =	2211.682	B.C. =	2.50 Kg/cm²	S.Level =	2211.429
T.O.F. =	2206.682	Ave. Height =	4.87	T.O.F. =	2206.682
Height =	5	Based Height =	5.00	Height =	4.747

Quantity of Concrete			
	Area	Legth	Volume
Wall	2.802	12.450	34.888
Found'n	2.905	12.450	36.167
Key	0.508	12.450	6.318
		Total Volume =	**77.374**

STRIP NO. 501

Suprv'g. Consultant : ***ITAL CONSULT***		***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***	
Civil Engineer	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 502 **TYPE 3**

Station: 974+687.500	Slope = 2:1	Station: 974+700.000
S.Level = 2211.429	B.C. = 2.50 Kg/cm²	S.Level = 2211.177
T.O.F = 2206.682		T.O.F = 2206.682
Height = 4.747	Length = 12.50	Height = 4.495
	Based Height = 4.747	
	Ave. Height = 4.62	

STRIP NO. 502

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 502

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.00	0.30	0.85	1.00	2.30	0.70	0.70

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 502	MK1	0.60 4.05	15	14	4.65	0.00	4.65	84	390.600	1.210	472.626
	MK2	4.05 0.60	15	25	4.65	0.00	4.65	84	390.600	3.854	1505.372
	MK3 O.L=60xØ	X = 0.60 11.40 1.84	15	14	14.44	0.00	14.44	56	808.640	1.210	978.454
	MK4	1.31 0.61 0.40 0.70	15	25	3.02	0.00	3.02	84	253.680	3.854	977.683
	MK5	0.00 0.00			0.00	0.00	0.00	0	0.000		0.000
	MK6	4.86	16	25	4.86	0.00	4.86	79	383.940	3.854	1479.705
	MK7	0.20 Ave= 2.27 Min= 2.15 Max= 2.40	32	16	2.47	0.00	2.47	40	98.840	1.580	156.167
	MK8	0.20 95.71° Ave= 4.52 Min= 4.42 Max= 4.67	15	16	4.72	0.00	4.72	84	396.564	1.580	626.571
	MK9	1.02 95.71° 0.30	15	16	1.32	0.00	1.32	84	110.880	1.580	175.190
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	22	293.480	1.210	355.111
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	22	290.840	0.888	258.266
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	20	264.400	0.888	234.787
	MK12var.	Min= 0.00 Ave= 5.73 Max= 5.73	15	12	5.73	0.00	5.73	2	11.458	0.888	10.175
										SUB TOTAL =	**7,230.108**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 502

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.000	0.300	0.850	1.000	2.300	0.700	0.700

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 502	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.245	0.888	23.306
	MK13	0.50 / 1.40 / 0.50	15	16	2.40	0.00	2.40	84	201.600	1.580	318.528
	TRW DOWEL	0.74 / 0.30	30	16	1.04	0.00	1.04	42	44.027	1.580	69.562
										SUB TOTAL =	**411.396**
										TOTAL =	**7,641.503**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	596.096
14	1806.191
16	1276.457
18	
20	
22	
25	3962.760
28	
30	
32	
36	
TOTAL =	**7,641.503**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF CONCRETE

Project : TAIF AL BAHA - ABHA ROAD — Page: 4 of 4

Item : 50202 REINFORCED CONCRETE Class 280/20 — Drwg. No. _____

Retaining Wall

STRIP NO. 502 **TYPE 3**

Station: 974+687.500	Slope = 2:1	Station: 974+700.000
S.Level = 2211.429	B.C. = 2.50 Kg/cm²	S.Level = 2211.177
T.O.F. = 2206.682	Ave. Height = 4.62	T.O.F. = 2206.682
Height = 4.747	Based Height = 4.75	Height = 4.495

Quantity of Concrete

	Area	Legth	Volume
Wall	2.657	12.400	32.948
Found'n	2.905	12.400	36.022
Key	0.508	12.400	6.293
		Total Volume =	**75.263**

STRIP NO. 502

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 503 **TYPE 3**

Station: 974+700.000	Slope = 2:1	Station: 974+712.500
S.Level = 2211.177	B.C. = 2.50 Kg/cm²	S.Level = 2210.924
T.O.F = 2206.682		T.O.F = 2206.682
Height = 4.495	Length = 12.50	Height = 4.242
	Based Height = 4.495	
	Ave. Height = 4.37	

STRIP NO. 503

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 503

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.00	0.30	0.85	1.00	2.30	0.70	0.70

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 503	MK1	0.60 4.05	15	14	4.65	0.00	4.65	84	390.600	1.210	472.626
	MK2	4.05 0.60	15	25	4.65	0.00	4.65	84	390.600	3.854	1505.372
	MK3 O.L=60xØ	X = 0.60 11.40 1.84	15	14	14.44	0.00	14.44	56	808.640	1.210	978.454
	MK4	1.31 0.61 0.40 0.70	15	25	3.02	0.00	3.02	84	253.680	3.854	977.683
	MK5	0.00 0.00			0.00	0.00	0.00	0	0.000		0.000
	MK6	4.86	16	25	4.86	0.00	4.86	79	383.940	3.854	1479.705
	MK7	0.20 Ave= 2.02 Min= 1.89 Max= 2.15	32	16	2.22	0.00	2.22	40	88.740	1.580	140.209
	MK8	0.20 95.71° Ave= 4.27 Min= 4.16 Max= 4.42	15	16	4.47	0.00	4.47	84	375.354	1.580	593.059
	MK9	1.02 95.71° 0.30	15	16	1.32	0.00	1.32	84	110.880	1.580	175.190
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	22	293.480	1.210	355.111
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	22	290.840	0.888	258.266
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	20	264.400	0.888	234.787
	MK12var.	Min= 0.00 Ave= 5.76 Max= 5.76	15	12	5.76	0.00	5.76	2	11.517	0.888	10.227
										SUB TOTAL =	**7,180.690**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 503

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	5.000	0.300	0.850	1.000	2.300	0.700	0.700

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 503	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.245	0.888	23.306
	MK13	0.50 / 1.40 / 0.50	15	16	2.40	0.00	2.40	84	201.600	1.580	318.528
	TRW DOWEL	0.74 / 0.30	30	16	1.04	0.00	1.04	42	44.027	1.580	69.562
										SUB TOTAL =	**411.396**
										TOTAL =	**7,592.086**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	596.148
14	1806.191
16	1226.987
18	
20	
22	
25	3962.760
28	
30	
32	
36	
TOTAL =	**7,592.086**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 503 **TYPE 3**

Station:	974+700.000	Slope =	2:1	Station:	974+712.500
S.Level =	2211.177	B.C. =	2.50 Kg/cm²	S.Level =	2210.924
T.O.F. =	2206.682	Ave. Height =	4.37	T.O.F. =	2206.682
Height =	4.495	Based Height =	4.50	Height =	4.242

Quantity of Concrete			
	Area	Legth	Volume
Wall	2.512	12.400	31.147
Found'n	2.905	12.400	36.022
Key	0.508	12.400	6.293
		Total Volume =	**73.462**

STRIP NO. 503

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 401 **TYPE 3**

Station:	974+712.500	Slope =	2:1	Station:	974+725.000
S.Level =	2210.924	B.C. =	2.50 Kg/cm²	S.Level =	2210.84
T.O.F =	2206.924			T.O.F =	2206.924
Height =	4	Length =	12.50	Height =	3.916
		Based Height =	4		
		Ave. Height =	3.96		

STRIP NO. 401

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 401

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	4.00	0.30	0.70	0.70	1.80	0.60	0.40

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 401	MK1	0.50 3.10	15	14	3.60	0.00	3.60	84	302.400	1.210	365.904
	MK2	3.10 0.50	15	25	3.60	0.00	3.60	84	302.400	3.854	1165.450
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	44	626.560	1.210	758.138
	MK4	0.79 0.51 0.35 0.40	15	20	2.05	0.00	2.05	84	172.200	2.470	425.334
	MK5	0.00 0.00			0.00	0.00	0.00	0	0.000		0.000
	MK6	3.71	16	20	3.71	0.00	3.71	79	293.090	2.470	723.932
	MK7	0.20 Ave= 1.84 Min= 1.80 Max= 1.88	32	16	2.04	0.00	2.04	40	81.520	1.580	128.802
	MK8	0.20 95.71° Ave= 3.86 Min= 3.84 Max= 3.92	20	16	4.06	0.00	4.06	63	255.654	1.580	403.933
	MK9	0.82 95.71° 0.30	20	16	1.12	0.00	1.12	63	70.560	1.580	111.485
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	20	266.800	1.210	322.828
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	20	264.400	0.888	234.787
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	18	237.960	0.888	211.308
	MK12var.	Min= 0.00 Ave= 0.72 Max= 0.72	15	12	0.72	0.00	0.72	0	0.000	0.888	0.000
										SUB TOTAL =	**4,851.901**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 401

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	4.000	0.300	0.700	0.700	1.800	0.600	0.400

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 401	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.241	0.888	23.302
	MK13	0.50 / 0.90 / 0.50	15	16	1.90	0.00	1.90	84	159.600	1.580	252.168
	TRW DOWEL	0.74 / 0.30	30	16	1.04	0.00	1.04	42	44.027	1.580	69.562
										SUB TOTAL =	**345.032**
										TOTAL =	**5,196.933**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	538.959
14	1446.870
16	896.388
18	
20	1149.266
22	
25	1165.450
28	
30	
32	
36	
TOTAL =	**5,196.933**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 401 **TYPE 3**

Station:	974+712.500	Slope =	2:1	Station:	974+725.000
S.Level =	2210.924	B.C. =	2.50 Kg/cm²	S.Level =	2210.84
T.O.F. =	2206.924	Ave. Height =	3.96	T.O.F. =	2206.924
Height =	4	Based Height =	4.00	Height =	3.916

Quantity of Concrete

	Area	Legth	Volume
Wall	1.979	12.400	24.540
Found'n	1.920	12.400	23.808
Key	0.260	12.400	3.224
		Total Volume =	**51.572**

STRIP NO. 401

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Retaining Wall

STRIP NO. 402 **TYPE 3**

Station: 974+725.000	Slope = 2:1	Station: 974+737.500
S.Level = 2210.84	B.C. = 2.50 Kg/cm²	S.Level = 2210.757
T.O.F = 2207.173		T.O.F = 2207.173
Height = 3.667	Length = 12.50	Height = 3.584
	Based Height = 3.667	
	Ave. Height = 3.63	

STRIP NO. 402

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 402

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	4.00	0.30	0.70	0.70	1.80	0.60	0.40

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 402	MK1	0.50 3.10	15	14	3.60	0.00	3.60	84	302.400	1.210	365.904
	MK2	3.10 0.50	15	25	3.60	0.00	3.60	84	302.400	3.854	1165.450
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	44	626.560	1.210	758.138
	MK4	0.79 0.51 0.35 0.40	15	20	2.05	0.00	2.05	84	172.200	2.470	425.334
	MK5	0.00 0.00			0.00	0.00	0.00	0	0.000		0.000
	MK6	3.71	16	20	3.71	0.00	3.71	79	293.090	2.470	723.932
	MK7	0.20 Ave= 1.51 Min= 1.46 Max= 1.55	32	16	1.71	0.00	1.71	40	68.220	1.580	107.788
	MK8	0.20 95.71° Ave= 3.53 Min= 3.50 Max= 3.58	20	16	3.73	0.00	3.73	63	234.707	1.580	370.836
	MK9	0.82 95.71° 0.30	20	16	1.12	0.00	1.12	63	70.560	1.580	111.485
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	18	240.120	1.210	290.545
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	18	237.960	0.888	211.308
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	16	211.520	0.888	187.830
	MK12var.	Min= 0.00 Ave= 0.72 Max= 0.72	15	12	0.72	0.00	0.72	0	0.000	0.888	0.000
										SUB TOTAL =	**4,718.550**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Retaining Wall

STRIP NO. 402

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	4.000	0.300	0.700	0.700	1.800	0.600	0.400

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 402	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.241	0.888	23.302
	MK13	0.50 / 0.90 / 0.50	15	16	1.90	0.00	1.90	84	159.600	1.580	252.168
	TRW DOWEL	0.74 / 0.30	30	16	1.04	0.00	1.04	42	44.027	1.580	69.562
										SUB TOTAL =	**345.032**
										TOTAL =	**5,063.581**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	492.002
14	1414.587
16	842.277
18	
20	1149.266
22	
25	1165.450
28	
30	
32	
36	
TOTAL =	**5,063.581**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 402 **TYPE 3**

Station: 974+725.000	Slope = 2:1	Station: 974+737.500
S.Level = 2210.84	B.C. = 2.50 Kg/cm²	S.Level = 2210.757
T.O.F. = 2207.173	Ave. Height = 3.63	T.O.F. = 2207.173
Height = 3.667	Based Height = 3.67	Height = 3.584

Quantity of Concrete			
	Area	Legth	Volume
Wall	1.813	12.400	22.478
Found'n	1.920	12.400	23.808
Key	0.260	12.400	3.224
		Total Volume =	**49.510**

STRIP NO. 402

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL (Grade 60)

Retaining Wall

Page: 1 of 4

Drwg. No. _____

STRIP NO. 403 **TYPE 3**

Station: 974+737.500	Slope = 2:1	Station: 974+750.000
S.Level = 2210.757	B.C. = 2.50 Kg/cm²	S.Level = 2210.673
T.O.F = 2207.336		T.O.F = 2207.336
Height = 3.421	Length = 12.50	Height = 3.337
	Based Height = 3.421	
	Ave. Height = 3.38	

STRIP NO. 403

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 403

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	4.00	0.30	0.70	0.70	1.80	0.60	0.40

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 403	MK1	0.50 3.10	15	14	3.60	0.00	3.60	84	302.400	1.210	365.904
	MK2	3.10 0.50	15	25	3.60	0.00	3.60	84	302.400	3.854	1165.450
	MK3 O.L=60xØ	X = 0.50 11.50 1.74	15	14	14.24	0.00	14.24	44	626.560	1.210	758.138
	MK4	0.79 0.51 0.35 0.40	15	20	2.05	0.00	2.05	84	172.200	2.470	425.334
	MK5	0.00 0.00			0.00	0.00	0.00	0	0.000		0.000
	MK6	3.71	16	20	3.71	0.00	3.71	79	293.090	2.470	723.932
	MK7	0.20 Ave= 1.26 Min= 1.22 Max= 1.30	32	16	1.46	0.00	1.46	40	58.360	1.580	92.209
	MK8	0.20 95.71° Ave= 3.28 Min= 3.25 Max= 3.34	20	16	3.48	0.00	3.48	63	219.177	1.580	346.300
	MK9	0.82 95.71° 0.30	20	16	1.12	0.00	1.12	63	70.560	1.580	111.485
	MK10 O.L=60xØ	12.00 1.34	15	14	13.34	0.00	13.34	18	240.120	1.210	290.545
	MK11 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	18	237.960	0.888	211.308
	MK12 O.L=60xØ	12.00 1.22	15	12	13.22	0.00	13.22	16	211.520	0.888	187.830
	MK12var.	Min= 0.00 Ave= 0.72 Max= 0.72	15	12	0.72	0.00	0.72	0	0.000	0.888	0.000
										SUB TOTAL =	**4,678.434**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Retaining Wall

STRIP NO. 403

L	Hw-Std.	Ttop	Tbot.	Toe	Heel	Tf	Tk
12.500	4.000	0.300	0.700	0.700	1.800	0.600	0.400

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STRIP NO. 403	MK12edge O.L=60xØ	12 / 1.12	15	12	13.12	0.00	13.12	2	26.241	0.888	23.302
	MK13	0.50 / 0.90 / 0.50	15	16	1.90	0.00	1.90	84	159.600	1.580	252.168
	TRW DOWEL	0.74 / 0.30	30	16	1.04	0.00	1.04	42	44.027	1.580	69.562
										SUB TOTAL =	**345.032**
										TOTAL =	**5,023.466**

WEIGHT OF BAR FOR EACH DIAMETER

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	492.002
14	1414.587
16	802.161
18	
20	1149.266
22	
25	1165.450
28	
30	
32	
36	
TOTAL =	**5,023.466**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 4

Item : **50202 REINFORCED CONCRETE Class 280/20** Drwg. No. _____

Retaining Wall

STRIP NO. 403 **TYPE 3**

Station:	974+737.500	Slope =	2:1	Station:	974+750.000
S.Level =	2210.757	B.C. =	2.50 Kg/cm²	S.Level =	2210.673
T.O.F. =	2207.336	Ave. Height =	3.38	T.O.F. =	2207.336
Height =	3.421	Based Height =	3.42	Height =	3.337

Quantity of Concrete

	Area	Legth	Volume
Wall	1.690	12.450	21.034
Found'n	1.920	12.450	23.904
Key	0.260	12.450	3.237
		Total Volume =	**48.175**

STRIP NO. 403

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF R.C.S.P

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 1

Item : **60605 R.C. SLOPE PROTECTION** Drwg. No. _____

NO.	STATION		Length	Slope (%)		L1	L2	Thick	AREA
	From	To	(m.)	From	To	(m.)	(m.)	(m.)	(m²)
1	974+675.00	974+687.50	12.5	0.4850	0.7420	2.535	20.768	0.15	291.288
2	974+687.50	974+700.00	12.5	0.7420	0.9990	2.510	20.216	0.15	284.075
3	974+700.00	974+712.50	12.5	0.9990	1.2495	2.486	19.687	0.15	277.163
4	974+712.50	974+725.00	12.5	1.2495	1.5000	2.462	19.141	0.15	270.038
5	974+725.00	974+737.50	12.5	1.5000	1.5000	2.451	18.593	0.15	263.05
6	974+737.50	974+750.00	12.5	1.5000	1.5000	2.451	18.07	0.15	256.513
							TOTAL =		**1,642.127**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

BRIDGES

الجسور

Suprv'g Consultant: ITAL CONSULT	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

COMPUTATION OF FINAL QUANTITIES
الكميات النهائية

Project: DOUBLING TAIF-BAHA-ABHA ROAD

BRIDGE QUANTITY

Item No.	Description	Unit	PRICE	QUANTITY	VALUE	REMARKS
2090101	STRUCTURAL EXCAVATION	M³	20.00	760.50	15,209.93	
50201	REINFORCED STEEL - GRADE 60	TONS	3,500.00	258.02	903,077.34	
5030107	SUPER-STRUCTURE CONCRETE CLASS (20/350)	M³	1,200.00	474.68	569,616.24	
5030205	SUB-STRUCTURE CONCRETE CLASS (20/280)	M³	650.00	525.59	341,632.54	
5031104	BEARING DEVICE ELASTOMETRIC	Unit	1,500.00	42.00	63,000.00	
5031401	EXPANSION JOINTS	LM	1,000.00	47.88	47,880.00	
51001	BRIDGE PARAPET	LM	250.00	138.08	34,520.00	
51201	WATER PROOF MEMBRANE	M²	25.00	746.70	18,667.47	
				TOTAL =	1,993,603.52	

Consultant: ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor: M. A. AL SWAILEM CO.
Q.S. Res. Engineer		Q.S. Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: __1_ of _1_

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

SUPER & SUB-STRUCTURE

50201 REINFORCED STEEL Grade 60

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
50201	REINFORCED STEEL Grade 60	KGS	258,022.096	Page 1 of 1
	Grand total	KGS	258,022.096	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: __1_ of _1_

Item : **5030107** **SUPER-STRUCTURE CONCRETE (Class 20/350)** Drwg. No. _____

5030107 SUPER-STRUCTURE CONCRETE (Class 20/350)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
5030107	SUPER-STRUCTURE CONCRETE (Class 20/350)	M²	474.680	Page 1 of 1
	Grand total	M²	474.680	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: __1_ of _1_

Item : **5030205 SUB-STRUCTURE CONCRETE(Class20/280)** Drwg. No. _____

5030205 SUB-STRUCTURE CONCRETE(Class20/280)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
5030205	SUB-STRUCTURE CONCRETE(Class20/280)	M²	525.589	Page 1 of 1
	Grand total	M²	525.589	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: __1_ of _1_
Item : **5031104 BEARING DEVICE** Drwg. No. _____

5031104 BEARING DEVICE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
5031104	BEARING DEVICE	PCS.	42	Page 3 of 4
	Grand total	PCS.	42	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

5031401 EXPANSION JOINT

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
5031401	EXPANSION JOINT	M	47.880	Page 2 of 4
	Grand total	M^3	47.880	

FINAL QUANTITIES
الكميات النهائية

Project : DOUBLING TAIF-BAHA-ABHA ROAD
Item : 51001 BRIDGE PARAPET

Page: __1_ of _1_
Drwg. No. _____

51001 BRIDGE PARAPET

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
51001	BRIDGE PARAPET	M	138.080	Page 4 of 4
	Grand total	M	138.080	

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES

الكميات النهائية

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: __1_ of _1_

Item : 51201 WATER PROOF MEMBRANE — Drwg. No. _____

51201 WATER PROOF MEMBRANE

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
51201	WATER PROOF MEMBRANE	M²	746.699	Page 1 of 4
	Grand total	M²	746.699	

Suprv'g. Consultant : *ITAL CONSULT*	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES

الكميات النهائية

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: __1_ of _1_

Item : ***2090101*** **STRUCTURAL EXCAVATION** Drwg. No. _____

2090101 STRUCTURAL EXCAVATION

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
2090101	STRUCTURAL EXCAVATION	M^3	760.497	Page 1 & 2 @ STRL
	Grand total	M^3	760.497	

Suprv'g. Consultant : ***ITAL CONSULT***	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 1 of 1

Item : 5030205 SUB-STRUCTURE CONCRETE(Class20/280) — Drwg. No.

BRIDGE 1

S.R. NO.	DESCRIPTION	Unit	VOLUME (m³)	REMARKS
1	PIER FOUNDATION	M³	165.000	
2	PIER COLUMN	M³	34.800	
3	PIER CAP	M³	54.115	
4	ABUTMENT FOUNDATION	M³	165.100	
5	ABUTMENT COLUMN	M³	30.088	
6	ABUTMENT CAP	M³	48.116	
7	APPROACH SLAB	M³	28.368	
TOTAL =			**525.589**	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD (Section 3)	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Qty. Surveyor — Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __3__

Item : ***5030205*** **CONCRETE IN PIER FOUNDATION** Drwg. No. _____

Pier Foundation

Length =	11.000	m.
Width =	5.000	m.
Height =	1.500	m.
Pier Dia. =	1.200	m.
NO.OF PIERS	2	

Pier Column

Top of P1 Column 1 Level	=	2149.370
Top of P1 Column 2 Level	=	2149.159
Top of P2 Column 1 Level	=	2148.916
Top of P2 Column 2 Level	=	2148.705
Top of P1 Foundation Level	=	2141.670
Top of P2 Foundation Level	=	2141.020
Superelevation	=	-3.20%

Pier Cap

W1	=	0.250	m.
W2	=	1.285	m.
W3	=	1.526	m.
H1	=	0.700	m.
H2	=	0.500	m.
L1	=	12.680	m.
L2	=	0.500	m.

PIER FOUNDATION (L x W x H)		
LENGTH	11.000	m
WIDTH	5.000	m
HEIGHT	1.500	m
QTY. (m^3)	82.500	m
Pier Foundation Qty.	**165.000**	**m^2**

PIER FOUNDATION SIDE ELEVATION

PIER FOUNDATION PLAN

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT		***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

DOUBLING TAIF-BAHA-ABHA ROAD

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _2__ of __3__

Item : ***5030205*** **CONCRETE IN PIER COLUMN** Drwg. No. _____

Superelevation (S.E.) = ***-3.20%***

PIER	COL.	EL 1	EL 2	H1	H2	Have	H3	H4	Have
P1	C1	2149.370		7.719	7.681	7.700			
	C2		2149.159				7.508	7.470	7.489
P2	C1	2148.916		7.915	7.877	7.896			
	C2		2148.705				7.704	7.666	7.685

TOP OF PIER FOUND-ATION LEVEL

P1 = 2141.670

P2 = 2141.020

No. Column	Diamter	Area	Have.	Volume
	m	m²	m	m³
P1C1	1.20	1.131	7.700	8.709
P1C2	1.20	1.131	7.489	8.470
P2C1	1.20	1.131	7.896	8.930
P2C2	1.20	1.131	7.685	8.692
			COLUMN TOTAL	**34.800**

COLUMN SECTION

PIER COLUMN ELEVATION

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT	***DOUBLING TAIF-BAHA-ABHA ROAD***	***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _3__ of __3__

Item : ***5030205*** **CONCRETE IN PIER CAP** Drwg. No. _____

Given :

Wa	=	1.906	m.	L1	=	12.680	m.	H1	=	0.700	m.
W1	=	0.250	m.	L2	=	0.500	m.	H2	=	0.500	m.
W2	=	1.285	m.	L3	=	11.680	m.				
W3	=	1.526	m.								

NO.OF PIER CAP 2

PIER CAP SIDE ELEVATION

PIER CAP ELEVATION

AREA 1 (A1)

= Wa x L1

= 24.162 m².

AREA 2 (A2)

= (w2 + w3)/2 x L3

= 16.416 m².

VOLUME 1 (V1)

= A1 x h1

= 16.913 m³.

VOLUME 2 (V2)

= (A1+A2)/2 x h2

= 10.144 m³.

Total Volume = = 54.115 m³.

PIER CAP PLAN

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT	***DOUBLING TAIF-BAHA-ABHA ROAD***	***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: _1__ of __3__

Item : *5030205* CONCRETE IN ABUTMENT FOUNDATION — Drwg. No. _____

ABUTMENT FOUNDATION

LOC'N	Length	Width	Thickness
ABT-1	13.000	6.000	1.200
ABT-2	13.000	5.000	1.100

NO.OF ABUT.	2	3	Col / Abut
Superelevation =	-3.20%		

ABUTMENT COLUMN

Top of A1 Column 1 Level	=	2149.574
Top of A1 Column 2 Level	=	2149.718
Top of A1 Column 3 Level	=	2149.862
Top of A2 Column 1 Level	=	2148.502
Top of A2 Coulumn 2 Level	=	2148.358
Top of A2 Column 3 Level	=	2148.214
Top of A1 Foundation Level	=	2143.610
Top of A2 Foundation Level	=	2144.408

	L1	L2	W
ABT-1	1.05	1.60	0.80
ABT-2	1.05	1.20	0.80

ABUTMENT CAP

H1 =	1.55	m.
H2 =	1.20	m.
H3 =	1.20	m.
W1 =	0.90	m.
W2 =	0.90	m.
L =	12.68	m.

ABUT'T FOUND'N SIDE ELEVATION

ABUTMENT FOUNDATION SECTION

(L x W x H)	ABT-1	ABT-2
LENGTH	13.000	13.000
WIDTH	6.000	5.000
HEIGHT	1.200	1.100
QTY. (m^3)	93.600	71.500

TOTAL QTY.	**165.100**	**m^3**

ABUTMENT FOUNDATION PLAN

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT	*DOUBLING TAIF-BAHA-ABHA ROAD*	*M. A. AL SWAILEM CO.*	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _2__ of __3__

Item : ***5030205*** **CONCRETE IN ABUTMENT COLUMN** Drwg. No. _____

ABT.	COL.	H1	H2	Have	H3	H4	Have	H5	H6	Have
A1	C1	5.951	5.977	5.964						
	C2				6.095	6.121	6.108			
	C3							6.239	6.265	6.252
A2	C1	4.081	4.107	4.094						
	C2				3.937	3.963	3.950			
	C3							3.793	3.819	3.806

ABUT'T COLUMN SIDE ELEVATION

ABUTMENT COLUMN SECTION

ABUT. COLUMN	(L1+L2)/2 x W x Have)
A1C1	6.322
A1C2	6.474
A1C3	6.627
A2C1	3.685
A2C2	3.555
A2C3	3.425
QTY. (m^3)	**30.088**

TOTAL QTY.	**30.088**	**m^3**

ABUTMENT COLUMN PLAN

Suprv'g. Consultant :			Contractor :	
ITAL CONSULT		***DOUBLING TAIF-BAHA-ABHA ROAD***	***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _3__ of __3__

Item : ***5030205*** **CONCRETE IN ABUTMENT CAP** Drwg. No. _____

Given:

H1 =	1.55	m.	H3 =	1.20	m.
H2 =	1.20	m.			
W1 =	0.90	m.			
W2 =	0.90	m.			
L =	12.68	m.			
Wa =	0.90	m.			

No. of Abutment = **2**

AREA A =	(0.25*2+0.25)/2)* 0.25 =	0.094	m²
AREA B =	H1 x 0.25 =	0.388	m²
AREA C =	(0.25 + Wa) x h2 =	1.380	m²
AREA D =	Wa x h3 =	1.080	m²
VOLUME A =	area A x (L-0.44 x 2) =	1.106	m³
VOLUME B =	area B x L =	4.914	m³
VOLUME C =	area C x L =	17.498	m³
VOLUME D =	area D x 0.25 x 2 =	0.540	m³
Total Vol. =	**Va + Vb + Vc +Vd =**	**24.058**	**m³**
Grand Total =		**48.116**	**m³**

SIDE ELEVATION

FRONT ELEVATION

P L A N

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT	***DOUBLING TAIF-BAHA-ABHA ROAD***	***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : ***5030205*** **CONCRETE IN BRIDGE APPROACH SLAB** Drwg. No. _____

APPROACH SLAB DIMENSION :

L = 4.00 m.
W = 11.82 m.
T = 0.30 m.

No. of A. Slabs = 2

APPROACH SLAB PLAN

Volume for one approach slab = L x W x T

L m	W m	T m	Volume m³
4.00	11.820	0.30	14.184

Volume for all approach slabs = **28.368** m³

APPROACH SLAB SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 1 of 1

Item : 5030107 SUPER-STRUCTURE CONCRETE (Class 20/350) — Drwg. No.

BRIDGE 1

S.R. NO.	DESCRIPTION	Unit	VOLUME (m³)	REMARKS
1	PRE-CAST T-GIRDERS	M³	323.950	
2	SLAB (CAST IN SITU)	M³	136.474	
3	DIAPHRAGM BEAMS	M³	14.256	
TOTAL =			474.680	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD (Section 3)	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Qty. Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __2__

Item : ***5030107*** **CONCRETE IN PRECAST GIRDER** Drwg. No. _____

Given :

W	=	1.780	m.	H1	=	0.060	m.	No. of Girder per span	=	7
W1	=	0.590	m.	H2	=	0.129	m.	No. of edge Girder per span	=	2
W2	=	0.600	m.	H3	=	0.120	m.	No. of mid Girder per span	=	5
W3	=	0.500	m.	H4	=	1.080	m.	No. of span	=	3
S.E.	=	-1.500	%	L1	=	19.900	m.			
				L2	=	19.300	m.			

A1 m²		A2 m²		A3 m²		A4 m²		AREA m²	VOLUME m³
(h1+h2)/2	x W1	(h2+h3)/2	x W2	(h3+h1)/2	x W1	(w2+w3)/2	x h4	A1+A2+A3+A4	((At x L1) x no. of girder) - Ded'n) x no. of span
0.056		0.075		0.053		0.594		**0.778**	**323.950**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _2__ of __2__
Item : ***5030107*** **CONCRETE IN PRECAST GIRDER** Drwg. No. _____

Volume Deduction:

Mid Girder deduction	=	(A1+A3) x 0.30 x 2 x no. of mid girder	=	0.327	m³
Edge Girder deduction	=	(A1+A3) x 0.30 x no. of edge girder	=	0.065	m³
		Volume Deduction per Span =		**0.392**	m³

PLAN FOR MID GIRDER **PLAN FOR EDGE GIRDER**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : ***5030107*** **CONCRETE IN BRIDGE SLAB** Drwg. No. _____

SLAB DIMENSION :

L = 19.90 m.
W = 12.70 m.
T = 0.18 m.

No. of Slabs = 3

SLAB PLAN

Volume for one slab = L x W x T

L m	W m	T m	Volume m³
19.90	12.700	0.18	45.491

Volume for all slabs = **136.474** m³

SLAB SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : ***5030107*** **CONCRETE IN BRIDGE DIAPHRAGM** Drwg. No. _____

DIAPHRAGM DIMENSION :

L = 1.32 m.
W = 0.30 m.
H = 1.000 m.

No. of Diaphragms = 36

DIAPHRAGM SECTION

Volume for one diaphragm = L x W x H

L m	W m	H m	Volume m³
1.320	0.300	1.00	0.396

Volume for all diaphragm = **14.256** m³

DIAPHRAGM ELEVATION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 1 of 1

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge 1

-

S U M M A R Y

S.R. NO.	DESCRIPTION	Unit	WEIGHT (kgs)	REMARKS
1	PIER FOUNDATION	kgs.	14,596.903	SUB-STRUCTURE
2	PIER COLUMN	kgs.	7,031.539	
3	PIER CAP	kgs.	15,570.667	
4	ABUTMENT FOUNDATION	kgs.	19,880.001	
5	ABUTMENT COLUMN	kgs.	6,270.740	
6	ABUTMENT CAP	kgs.	11,723.254	
7	APPROACH SLAB	kgs.	4,586.338	
		TOTAL =	79,659.443	
8	PRE-CAST T-GIRDERS	kgs.	141,928.589	SUPER STRUCTURE
9	SLAB (CAST IN SITU)	kgs.	34,014.205	
10	DIAPHRAGM BEAMS	kgs.	2,419.858	
		TOTAL =	178,362.653	
		GRAND TOTAL	258,022.096	

TOTAL WEIGHT OF STEEL PER BAR DIAMETER

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	0.000
10	5,195.757
12	14,276.025
14	22,582.177
16	50,096.537
18	19,601.072
20	8,682.078
22	0.000
25	28,547.737
28	0.000
30	0.000
32	106,902.812
36	0.000
TOTAL =	255,884.19

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	0.000
10	0.000
12	123.183
14	282.075
16	376.571
18	0.000
20	622.440
22	0.000
25	77.080
28	0.000
30	0.000
32	656.552
36	0.000
TOTAL =	2,137.90

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 1 of 7

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Bridge No. 1

Pier Foundation, Column & Cap

Pier Dimensions:

Location	Length m.	Width m.	Height m.	Diameter m.
Pier Foundation	11.000	5.000	1.500	
Pier 1 Column 1			7.700	1.200
Pier 1 Column 2			7.489	1.200
Pier 2 Column 1			7.896	1.200
Pier 2 Column 2			7.685	1.200

Superelevation =	-3.20%
No. of Pier =	2
No. of Column =	4
No. of Pier Cap =	2
No. of Cap Plinth =	14

Location	W1 m.	W2 m.	W3 m.	H1 m.	H2 m.	L1 m.	L2 m.
Pier Cap	0.250	1.285	1.526	0.700	0.500	12.680	0.500
Pier Cap Plinth	0.500	0.650	0.700	0.100	0.075	0.600	0.775
Pier Cap Sidings	2.026	1.785		1.200		0.250	

SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 2 of 7

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

Pier Foundation

Pier Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
LONGITUDINAL BOTTOM	PF1 O.L=60xØ/2	1.363 / 8.004	17	25	9.367	0.00	9.367	60	561.990	3.854	2165.909
LONGITUDINAL BOTTOM	PF2 O.L=60xØ/2	1.363 / 4.371	17	25	5.734	0.00	5.734	60	344.010	3.854	1325.815
TRANSVERSE BOTTOM	PF3	X = 1.322 / 4.890	15	20	7.534	0.00	7.534	146	1099.964	2.470	2716.911
DINAL SIDE BARS	PF4	10.85	28	16	10.850	0.00	10.850	12	130.200	1.580	205.716
TRANSVERSE SIDE BARS	PF5	X = 1.060 / 4.812	28	16	4.812	0.00	4.812	12	57.744	1.580	91.236
LONGITUDINAL TOP	PF6	10.900	13	25	10.900	0.00	10.900	80	872.000	3.854	3360.688
TRANSVERSE TOP	PF7	4.900	15	18	4.900	0.00	4.900	146	715.400	2.000	1430.800
COLUMN STARTER	PF8	0.400 / 3.589	12	32	3.989	0.00	3.989	112	446.768	6.313	2820.446
COLUMN STIRRUP CIRCULAR	PF9	D=1.09 O.L=0.20	20	12	3.618	0.00	3.618	32	115.778	0.888	102.811
CHAIRS	PF14	0.400 / 1.262 / 0.400	as	16	3.724	0.00	3.724	64	238.336	1.580	376.571
									SUB TOTAL =		14,596.903

Main Reinforcement		Chairs & Spacers	
BAR SIZE	WEIGHT (kg)	BAR SIZE	WEIGHT (kg)
8		8	
10		10	
12	102.811	12	
14		14	
16	296.952	16	376.571
18	1,430.800	18	
20	2,716.911	20	
22		22	
25	6,852.412	25	
28		28	
30		30	
32	2,820.446	32	
36		36	
TOTAL =	14,220.332	TOTAL =	376.571

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

GENERAL TECHNICAL ADMINISTRATION

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 3 of 7

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

Pier Column

Pier Column

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
PIER 1 COLUMN											
SHORT COLUMN LEFT	P1C1	0.300 / 8.700	12	32	9.000	0.00	9.000	28	252.000	6.313	1590.876
HIGH COLUMN RIGHT	P1C2	0.300 / 8.489	12	32	8.789	0.00	8.789	28	246.092	6.313	1553.579
COLUMN STIRRUP CIRCULAR	P1ST	D=1.11 O.L=0.20	15	12	3.681	0.00	3.681	102	375.451	0.888	333.401
PIER 2 COLUMN											
SHORT COLUMN LEFT	P2C1	0.300 / 8.896	12	32	9.196	0.00	9.196	28	257.488	6.313	1625.522
HIGH COLUMN RIGHT	P2C2	0.300 / 8.685	12	32	8.985	0.00	8.985	28	251.580	6.313	1588.225
COLUMN STIRRUP CIRCULAR	P2ST	D=1.11 O.L=0.20	15	12	3.681	0.00	3.681	104	382.813	0.888	339.938
									SUB TOTAL =	**7,031.539**	

Main Reinforcement		Chairs & Spacers	
BAR SIZE	**WEIGHT (kg)**	**BAR SIZE**	**WEIGHT (kg)**
8		8	
10		10	
12	673.338	12	
14		14	
16		16	
18		18	
20		20	
22		22	
25		25	
28		28	
30		30	
32	6,358.201	32	
36		36	
TOTAL =	**7,031.539**	**TOTAL =**	**0.000**

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT	***DOUBLING TAIF-BAHA-ABHA ROAD***	***M. A. AL SWAILEM CO.***	
Civil Engineer	Res. Engineer	Quantity Surveyor	Proj. Manager

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 4 of 7

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Pier Cap

Pier Cap

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
MAIN REIN. BOTTOM	PCAP-001	11.680	13	32	11.680	0.00	11.680	24	280.320	6.313	1769.660
MAIN REIN. BOTTOM	PCAP-002	10.440	13	32	10.440	0.00	10.440	24	250.560	6.313	1581.785
MAIN REIN. TOP	PCAP-003	12.000	10	32	12.000	0.00	12.000	32	384.000	6.313	2424.192
LEFT CANTILEVER	PCAP-004	5.504 0.588 0.651 1.884	28	32	8.627	0.00	8.627	24	207.037	6.313	1307.024
RIGHT CANTILEVER	PCAP-005	5.504 0.588 1.884	as	32	7.976	0.00	7.976	8	63.808	6.313	402.820
RIGHT CANTILEVER	PCAP-006	5.504 0.588 1.884 0.707	28	32	8.683	0.00	8.683	24	208.395	6.313	1315.595
LEFT CANTILEVER	PCAP-007	5.504 0.588 1.884	as	32	7.976	0.00	7.976	8	63.808	6.313	402.820
SIDE BARS	PCAP-008	12.00	20	20	12.000	0.00	12.000	16	192.000	2.470	474.240
SIDE BAR BOTTOM	PCAP-009	11.68	as	20	11.680	0.00	11.680	4	46.720	2.470	115.398
SIDE BAR CLOSER RIGHT	PCAP-010	X = 2.000 1.685	as	20	5.685	0.00	5.685	6	34.110	2.470	84.252
SIDE BAR CLOSER RIGHT	PCAP-011	X = 2.000 1.618	as	20	5.618	0.00	5.618	2	11.236	2.470	27.753
SIDE BAR CLOSER RIGHT	PCAP-012	X = 2.000 1.452	as	20	5.452	0.00	5.452	2	10.904	2.470	26.933
									SUB TOTAL =	**9,932.472**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Pier Cap

Pier Cap

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SIDE BAR CLOSER LEFT	PCAP-013	X = 2.000 1.946	as	20	5.946	0.00	5.946	6	35.676	2.470	88.120
SIDE BAR CLOSER LEFT	PCAP-014	X = 2.000 1.859	as	20	5.859	0.00	5.859	2	11.718	2.470	28.943
SIDE BAR CLOSER LEFT	PCAP-015	X = 2.000 1.693	as	20	5.693	0.00	5.693	2	11.386	2.470	28.123
EXT'NAL STIRRUPS	PCAP-016 to 111	1.669 :1.910 0.652 1.285 :1.526	O.L=0.12 12 0.506	16	5.810	0.00	5.810	192	1115.584	1.580	1762.623
EXT'NAL STIRRUPS RT. END	PCAP-112	1.729 0.652 1.618	O.L=0.12 as 0.186	16	5.264	0.00	5.264	2	10.527	1.580	16.633
EXT'NAL STIRRUPS RT. END	PCAP-113	1.729 0.652 1.452	O.L=0.12 as 0.344	16	5.412	0.00	5.412	2	10.824	1.580	17.103
INTERME DIATE STRP RT. END	PCAP-114	1.729 0.652 1.729	O.L=0.12 as	16	5.002	0.00	5.002	2	10.004	1.580	15.806
EXT'NAL STIRRUPS LT. END	PCAP-115	1.970 0.652 1.859	O.L=0.12 as 0.186	16	5.746	0.00	5.746	2	11.491	1.580	18.156
EXT'NAL STIRRUPS LT. END	PCAP-116	1.970 0.652 1.693	O.L=0.12 as 0.344	16	5.894	0.00	5.894	2	11.788	1.580	18.626
INTERME DIATE STRP LT. END	PCAP-117	1.970 0.652 1.970	O.L=0.12 as	16	5.484	0.00	5.484	2	10.968	1.580	17.329
INTERME DIATE STIRRUPS	PCAP-118 to 213	1.296 :1.515 0.992 1.296 :1.515	O.L=0.12 12	14	5.035	0.00	5.035	192	966.720	1.210	1169.731
INTERME DIATE STRP RT. END	PCAP-214	1.293 0.952 1.293	O.L=0.12 as	14	4.730	0.00	4.730	2	9.461	1.210	11.448
									SUB TOTAL =	**3,192.642**	

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT	***DOUBLING TAIF-BAHA-ABHA ROAD***	***M. A. AL SWAILEM CO.***	
Civil Engineer	Res. Engineer	Quantity Surveyor	Proj. Manager

Pier Cap

Pier Cap

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
INTERMEDIATE STRP RT. END	PCAP-215	1.290 / 0.785 / 1.290	O.L=0.12 as	14	4.391	0.00	4.391	2	8.782	1.210	10.626
INTERMEDIATE STRP RT. END	PCAP-216	1.285 / 0.619 / 1.285	O.L=0.12 as	14	4.047	0.00	4.047	2	8.095	1.210	9.795
INTERMEDIATE STRP LT. END	PCAP-217	1.518 / 0.952 / 1.518	O.L=0.12 as	14	5.180	0.00	5.180	2	10.359	1.210	12.534
INTERMEDIATE STRP LT. END	PCAP-218	1.521 / 0.785 / 1.521	O.L=0.12 as	14	4.853	0.00	4.853	2	9.705	1.210	11.743
INTERMEDIATE STRP LT. END	PCAP-219	1.526 / 0.619 / 1.526	O.L=0.12 as	14	4.529	0.00	4.529	2	9.059	1.210	10.961
INTERNAL STIRRUPS	PCAP-220 to 315	0.432 : 0.505 / 0.992 / 0.432 : 0.505	O.L=0.12 12	14	3.161	0.00	3.161	192	606.912	1.210	734.364
INTERNAL STIRRUPS RT END	PCAP-316	0.432 / 0.952 / 0.432	O.L=0.12 as	14	3.008	0.00	3.008	2	6.017	1.210	7.280
INTERNAL STIRRUPS RT END	PCAP-317	0.432 / 0.785 / 0.432	O.L=0.12 as	14	2.675	0.00	2.675	2	5.350	1.210	6.473
INTERNAL STIRRUPS RT END	PCAP-318	0.432 / 0.619 / 0.432	O.L=0.12 as	14	2.342	0.00	2.342	2	4.683	1.210	5.667
INTERNAL STIRRUPS LT END	PCAP-319	0.505 / 0.952 / 0.505	O.L=0.12 as	14	3.154	0.00	3.154	2	6.307	1.210	7.632
INTERNAL STIRRUPS LT END	PCAP-320	0.505 / 0.785 / 0.505	O.L=0.12 as	14	2.820	0.00	2.820	2	5.641	1.210	6.825
INTERNAL STIRRUPS LT END	PCAP-321	0.505 / 0.619 / 0.505	O.L=0.12 as	14	2.487	0.00	2.487	2	4.974	1.210	6.019
									SUB TOTAL =	**829.918**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 7 of 7

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Pier Cap Plinth & Sidings

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
PLINTH VERTICAL	PCAP-322	X = 0.500 0.520	7	12	1.520	0.00	1.520	140	212.800	0.888	188.966
PLINTH VERTICAL	PCAP-323	X = 0.500 0.420	5	12	1.420	0.00	1.420	168	238.560	0.888	211.841
PLINTH HORIZON TAL	PCAP-324	X = 0.400 0.520	6	12	1.320	0.00	1.320	224	295.680	0.888	262.564
SIDE WALL RT SIDE VTL	PCAP-325	0.170 1.760 0.500 0.10	1.640 15 0.68	14	4.950	0.00	4.950	24	116.410	1.210	140.857
SIDE WALL RT SIDE HTL	PCAP-326	0.170 1.705	23	12	1.875	0.00	1.875	32	60.000	0.888	53.280
SIDE WALL LT SIDE VTL	1.640 PCAP-327 0.68	0.170 1.760 0.10 0.500	15	14	4.950	0.00	4.950	28	138.600	1.210	167.706
SIDE WALL LT SIDE HTL	PCAP-328	0.170 1.946	23	12	2.116	0.00	2.116	32	67.712	0.888	60.128
SPACER BOTTOM	PCAP-329	1.500	as	32	1.500	0.00	1.500	24	36.000	6.313	227.268
SPACER TOP	PCAP-330	2.000	as	32	2.000	0.00	2.000	24	48.000	6.313	303.024
									SUB TOTAL =	**1,615.634**	

Main Reinforcement			Chairs & Spacers	
BAR SIZE	**WEIGHT (kg)**		**BAR SIZE**	**WEIGHT (kg)**
8			8	
10			10	
12	776.780		12	
14	2,319.660		14	
16	1,866.277		16	
18			18	
20	873.763		20	
22			22	
25			25	
28			28	
30			30	
32	9,203.896		32	530.292
36			36	
TOTAL =	**15,040.375**		**TOTAL =**	**530.292**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 1 of 13

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Bridge No. 1

Abutment Foundation, Column & Cap

Abutment Dimensions:

Location	L1 m.	L2 m.	W1 m.	W2 m.	H1 m.	H2
Abutment 1 Found'n	13.000		6.000		1.200	
Abutment 2 Found'n	13.000		5.000		1.100	
Abutment 1 Column 1	1.050	1.600	0.800		5.964	
Abutment 1 Column 2	1.050	1.600	0.800		6.108	
Abutment 1 Column 3	1.050	1.600	0.800		6.252	
Abutment 2 Column 1	1.050	1.600	0.800		3.806	
Abutment 2 Column 2	1.050	1.600	0.800		3.950	
Abutment 2 Column 3	1.050	1.600	0.800		4.094	
Abutment Cap	12.680		1.150	0.900	1.200	
Abutment Sidings	0.900		0.250		1.200	
Abutment Back Wall	12.680		0.250		1.550	0.250
Abutment Wing Wall	0.250	3.250	0.440	0.440	1.950	0.800
Abut't Cap Plinth	0.600	0.775	0.650	0.700	0.100	0.075

Superelevation =	-3.20%
No. of Abut't =	2
No. of Column =	6
No. of Abut't Cap =	2
No. of Cap Plinth =	14

SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 2 of 13

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

Abutment 1 Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BOTTOM TRANSVERSE TOE	AF1	X = 1.038 5.875	15	25	7.950	0.00	7.950	87	691.650	3.854	2665.619
BOTTOM LONGITUDINAL	AF2	1.038 5.0375	15	25	6.075	0.00	6.075	80	486.000	3.854	1873.044
BOTTOM LONGITUDINAL	AF3	5.800	15	25	5.800	0.00	5.800	40	232.000	3.854	894.128
SIDE BAR LONGITUDINAL	AF4	12.00	as	16	12.000	0.00	12.000	6	72.000	1.580	113.760
SIDE BAR TRANSVERSE	AF5	X = 1.500 5.834	as	16	8.834	0.00	8.834	6	53.004	1.580	83.746
TOP LONGITUDINAL	AF6	8.490	15	25	8.490	0.00	8.490	40	339.600	3.854	1308.818
TOP LONGITUDINAL	AF7	5.910	15	25	5.910	0.00	5.910	40	236.400	3.854	911.086
TOP TRANSVERSE HEEL	AF8	5.875	15	18	5.875	0.00	5.875	87	511.125	2.000	1022.250
COLUMN STARTER SIDE BAR	AF9	0.400 2.700	25	25	3.100	0.00	3.100	36	111.600	3.854	430.106
COLUMN STARTER NEAR SDE	AF10	0.400 2.700	12	25	3.100	0.00	3.100	21	65.100	3.854	250.895
COLUMN STARTER FAR SDE	AF11	0.600 3.190	12	32	3.790	0.00	3.790	21	79.590	6.313	502.452
COL. REIN FAR SIDE	AF12-H	0.600 4.234	as	32	4.834	0.00	4.834	4	19.336	6.313	122.068
MID COL. REIN FAR SIDE	AF13-M	0.600 4.186	as	32	4.786	0.00	4.786	4	19.144	6.313	120.856
COL. REIN FAR SIDE	AF14-S	0.600 4.138	as	32	4.738	0.00	4.738	4	18.952	6.313	119.644
STR. STRRP PER.	AF15	1.387 0.700 1.387	O.L=0.10 as	14	4.374	0.00	4.374	3	13.122	1.210	15.877
									SUB TOTAL =		10,434.350

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 3 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment 1 Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STR. STRRP PER.	AF16	1.409 / 0.700 / 1.409	O.L=0.10 as	14	4.419	0.00	4.419	3	13.257	1.210	16.041
STR. STRRP PER.	AF17	1.432 / 0.700 / 1.432	O.L=0.10 as	14	4.464	0.00	4.464	3	13.392	1.210	16.204
STR. STRRP PER.	AF18	1.454 / 0.700 / 1.454	O.L=0.10 as	14	4.509	0.00	4.509	3	13.527	1.210	16.368
STR. STRRP PER.	AF19	1.477 / 0.700 / 1.477	O.L=0.10 as	14	4.554	0.00	4.554	3	13.662	1.210	16.531
STR. STRRP TRANS.	AF20	0.320 / 0.700 / 0.320	O.L=0.10 25	12	2.240	0.00	2.240	15	33.600	0.888	29.837
STR. STRRP LONG.	AF21	1.387 / 0.340 / 1.387	O.L=0.10 as	12	3.654	0.00	3.654	3	10.962	0.888	9.734
STR. STRRP LONG.	AF22	1.409 / 0.340 / 1.409	O.L=0.10 as	12	3.699	0.00	3.699	3	11.097	0.888	9.854
STR. STRRP LONG.	AF23	1.432 / 0.340 / 1.432	O.L=0.10 as	12	3.744	0.00	3.744	3	11.232	0.888	9.974
STR. STRRP LONG.	AF24	1.454 / 0.340 / 1.454	O.L=0.10 as	12	3.789	0.00	3.789	3	11.367	0.888	10.094
STR. STRRP LONG.	AF25	1.477 / 0.340 / 1.477	O.L=0.10 as	12	3.834	0.00	3.834	3	11.502	0.888	10.214
CHAIR	PF14	0.400 / 0.857 / 0.400	as	14	2.914	0.00	2.914	40	116.560	1.210	141.038
									SUB TOTAL =	**285.887**	

Main Reinforcement		**Chairs & Spacers**	
BAR SIZE	**WEIGHT (kg)**	**BAR SIZE**	**WEIGHT (kg)**
8		8	
10		10	
12	79.706	12	
14	81.021	14	141.038
16	197.506	16	
18	1,022.250	18	
20		20	
22		22	
25	8,333.697	25	
28		28	
30		30	
32	865.020	32	
36		36	
TOTAL =	**10,579.200**	**TOTAL =**	**141.038**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 4 of 13

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

Abutment 2 Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BOTTOM TRANSVERSE TOE	AF1	X = 0.938 4.875	15	25	6.750	0.00	6.750	87	587.250	3.854	2263.262
BOTTOM LONGITUDINAL	AF2	0.938 5.038	15	25	5.975	0.00	5.975	66	394.350	3.854	1519.825
BOTTOM LONGITUDINAL	AF3	5.800	15	25	5.800	0.00	5.800	33	191.400	3.854	737.656
SIDE BAR LONGITUDINAL	AF4	12.00	as	16	12.000	0.00	12.000	6	72.000	1.580	113.760
SIDE BAR TRANSVERSE	AF5	X = 1.500 4.834	as	16	7.834	0.00	7.834	6	47.004	1.580	74.266
TOP LONGITUDINAL	AF6	8.490	15	25	8.490	0.00	8.490	33	280.170	3.854	1079.775
TOP LONGITUDINAL	AF7	5.910	15	25	5.910	0.00	5.910	33	195.030	3.854	751.646
TOP TRANSVERSE HEEL	AF8	4.875	15	18	4.875	0.00	4.875	87	424.125	2.000	848.250
COLUMN STARTER SIDE BAR	AF9	0.400 2.600	25	25	3.000	0.00	3.000	36	108.000	3.854	416.232
COLUMN STARTER NEAR SDE	AF10	0.400 2.600	12	25	3.000	0.00	3.000	21	63.000	3.854	242.802
COLUMN STARTER FAR SDE	AF11	0.600 3.190	12	32	3.790	0.00	3.790	21	79.590	6.313	502.452
COL. REIN FAR SIDE	AF12-H	0.600 3.515	as	32	4.115	0.00	4.115	4	16.459	6.313	103.904
MID COL. REIN FAR SIDE	AF13-M	0.600 3.467	as	32	4.067	0.00	4.067	4	16.267	6.313	102.691
COL. REIN FAR SIDE	AF14-S	0.600 3.419	as	32	4.019	0.00	4.019	4	16.075	6.313	101.479
STR. STRRP PER.	AF15	1.387 0.700 1.387	O.L=0.10 as	14	4.374	0.00	4.374	3	13.122	1.210	15.877
									SUB TOTAL =		8,873.876

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 5 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment 2 Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STR. STRRP PER.	AF16	1.409 / 0.700 / 1.409	O.L=0.10 as	14	4.419	0.00	4.419	3	13.257	1.210	16.041
STR. STRRP PER.	AF17	1.432 / 0.700 / 1.432	O.L=0.10 as	14	4.464	0.00	4.464	3	13.392	1.210	16.204
STR. STRRP PER.	AF18	1.454 / 0.700 / 1.454	O.L=0.10 as	14	4.509	0.00	4.509	3	13.527	1.210	16.368
STR. STRRP PER.	AF19	1.477 / 0.700 / 1.477	O.L=0.10 as	14	4.554	0.00	4.554	3	13.662	1.210	16.531
STR. STRRP TRANS.	AF20	0.320 / 0.700 / 0.320	O.L=0.10 25	12	2.240	0.00	2.240	15	33.600	0.888	29.837
STR. STRRP LONG.	AF21	1.387 / 0.340 / 1.387	O.L=0.10 as	12	3.654	0.00	3.654	3	10.962	0.888	9.734
STR. STRRP LONG.	AF22	1.409 / 0.340 / 1.409	O.L=0.10 as	12	3.699	0.00	3.699	3	11.097	0.888	9.854
STR. STRRP LONG.	AF23	1.432 / 0.340 / 1.432	O.L=0.10 as	12	3.744	0.00	3.744	3	11.232	0.888	9.974
STR. STRRP LONG.	AF24	1.454 / 0.340 / 1.454	O.L=0.10 as	12	3.789	0.00	3.789	3	11.367	0.888	10.094
STR. STRRP LONG.	AF25	1.477 / 0.340 / 1.477	O.L=0.10 as	12	3.834	0.00	3.834	3	11.502	0.888	10.214
CHAIR	PF14	0.400 / 0.857 / 0.400	as	14	2.914	0.00	2.914	40	116.560	1.210	141.038
									SUB TOTAL =	**285.887**	

Main Reinforcement		**Chairs & Spacers**	
BAR SIZE	**WEIGHT (kg)**	**BAR SIZE**	**WEIGHT (kg)**
8		8	-
10	-	10	-
12	79.706	12	
14	81.021	14	141.038
16	188.026	16	
18	848.250	18	
20		20	
22		22	
25	7,011.197	25	
28		28	
30		30	
32	810.526	32	
36		36	
TOTAL =	**9,018.726**	**TOTAL =**	**141.038**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 6 of 13

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1
Abutment Column

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
ABUTMENT 1 SHORT COLUMN											
MAIN REIN. NEAR SD.	AS1	0.300 6.964	12	32	7.264	0.00	7.264	7	50.848	6.313	321.003
MAIN REIN. FAR SIDE	AS2	0.300 7.422	10	25	7.722	0.00	7.722	8	61.775	3.854	238.081
REIN. SIDE BARS	AS3	0.300 6.964	as	25	7.264	0.00	7.264	8	58.112	3.854	223.964
REIN. SIDE BARS	AS4	0.300 3.908	as	16	4.208	0.00	4.208	2	8.415	1.580	13.296
EXTERNAL STIRRUPS	AS5 to 44	0.96:1.411 0.720 0.96:1.411	O.L=0.12 15	14	4.050	0.00	4.050	40	161.995	1.210	196.014
IN'MEDIATE STRRP LONG.	AS45 to 84	0.96:1.411 0.360 0.96:1.411	O.L=0.12 15	12	3.330	0.00	3.330	40	133.195	0.888	118.277
IN'MEDIATE STRRP TRANS.	AS85	0.639 0.720 0.639	O.L=0.12 27	12	2.959	0.00	2.959	23	68.052	0.888	60.430
IN'MEDIATE STRRP TRANS.	AS86	0.470 0.720 0.470	O.L=0.12 37	12	2.621	0.00	2.621	17	44.549	0.888	39.560
ABUTMENT 1 MID COLUMN											
MAIN REIN. NEAR SD.	AM1	0.300 7.108	12	32	7.408	0.00	7.408	7	51.856	6.313	327.367
MAIN REIN. FAR SIDE	AM2	0.300 7.568	10	25	7.868	0.00	7.868	8	62.942	3.854	242.577
REIN. SIDE BARS	AM3	0.300 7.108	as	25	7.408	0.00	7.408	8	59.264	3.854	228.403
REIN. SIDE BARS	AM4	0.300 3.986	as	16	4.286	0.00	4.286	2	8.572	1.580	13.544
EXTERNAL STIRRUPS	AM5 to 45	0.96:1.413 0.720 0.96:1.413	O.L=0.12 15	14	4.052	0.00	4.052	41	166.119	1.210	201.004
IN'MEDIATE STRRP LONG.	AM46 to 86	0.96:1.413 0.360 0.96:1.413	O.L=0.12 15	12	3.332	0.00	3.332	41	136.599	0.888	121.300
IN'MEDIATE STRRP TRANS.	AM87	0.639 0.720 0.639	O.L=0.12 27	12	2.959	0.00	2.959	24	71.008	0.888	63.055
IN'MEDIATE STRRP TRANS.	AM88	0.471 0.720 0.471	O.L=0.12 37	12	2.622	0.00	2.622	17	44.570	0.888	39.578
									SUB TOTAL =	**2,447.454**	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 7 of 13

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1
Abutment Column

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
ABUTMENT 1 HIGH COLUMN											
MAIN REIN. NEAR SD.	AH1	0.300 7.252	12	32	7.552	0.00	7.552	7	52.864	6.313	333.730
MAIN REIN. FAR SIDE	AH2	0.300 7.559	10	25	7.859	0.00	7.859	8	62.870	3.854	242.303
REIN. SIDE BARS	AH3	0.300 7.252	as	25	7.552	0.00	7.552	8	60.416	3.854	232.843
REIN. SIDE BARS	AH4	0.300 4.065	as O.L=0.12	16	4.365	0.00	4.365	2	8.729	1.580	13.793
EXTERNAL STIRRUPS	AH5 to 46	0.96:1.414 0.720 0.96:1.414	15	14	4.053	0.00	4.053	42	170.244	1.210	205.995
IN'MEDIATE STRRP LONG.	AH47 to 88	0.96:1.414 0.360 0.96:1.414	O.L=0.12 15	12	3.333	0.00	3.333	42	140.004	0.888	124.324
IN'MEDIATE STRRP TRANS.	AH89	0.639 0.720 0.639	O.L=0.12 27	12	2.959	0.00	2.959	24	71.006	0.888	63.054
IN'MEDIATE STRRP TRANS.	AH86	0.471 0.720 0.471	O.L=0.12 37	12	2.623	0.00	2.623	18	47.214	0.888	41.926
ABUTMENT 2 SHORT COLUMN											
MAIN REIN. NEAR SD.	AS1	0.300 4.806	12	32	5.106	0.00	5.106	7	35.742	6.313	225.639
MAIN REIN. FAR SIDE	AS2	0.300 5.224	10	25	5.524	0.00	5.524	8	44.193	3.854	170.321
REIN. SIDE BARS	AS3	0.300 4.806	as	25	5.106	0.00	5.106	8	40.848	3.854	157.428
REIN. SIDE BARS	AS4	0.300 2.731	as	16	3.031	0.00	3.031	2	6.061	1.580	9.577
EXTERNAL STIRRUPS	AS5 to 30	0.96:1.37 0.720 0.96:1.37	O.L=0.12 15	14	4.010	0.00	4.010	26	104.264	1.210	126.160
IN'MEDIATE STRRP LONG.	AS31 to 56	0.96:1.37 0.360 0.96:1.37	O.L=0.12 15	12	3.290	0.00	3.290	26	85.544	0.888	75.963
IN'MEDIATE STRRP TRANS.	AM57	0.640 0.720 0.640	O.L=0.12 27	12	2.961	0.00	2.961	15	44.408	0.888	39.434
IN'MEDIATE STRRP TRANS.	AM58	0.457 0.720 0.457	O.L=0.12 37	12	2.593	0.00	2.593	11	28.525	0.888	25.330
									SUB TOTAL =		2,087.820

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Bridge No. 1

Abutment Column

Page: 8 of 13

Drwg. No. _____

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
	ABUTMENT 2 MID COLUMN										
MAIN REIN. NEAR SD.	AM1	0.300 4.950	12	32	5.250	0.00	5.250	7	36.750	6.313	232.003
MAIN REIN. FAR SIDE	AM2	0.300 5.372	10	25	5.672	0.00	5.672	8	45.375	3.854	174.874
REIN. SIDE BARS	AM3	0.300 4.950	as	25	5.250	0.00	5.250	8	42.000	3.854	161.868
REIN. SIDE BARS	AM4	0.300 2.809	as	16	3.109	0.00	3.109	2	6.218	1.580	9.825
EXTERNAL STIRRUPS	AM5 to 31	0.96:1.374 0.720 0.96:1.374	O.L=0.12 15	14	4.014	0.00	4.014	27	108.374	1.210	131.132
IN'MEDIATE STRRP LONG.	AM32 to 58	0.96:1.374 0.360 0.96:1.374	O.L=0.12 15	12	3.294	0.00	3.294	27	88.934	0.888	78.973
IN'MEDIATE STRRP TRANS.	AM59	0.640 0.720 0.640	O.L=0.12 27	12	2.960	0.00	2.960	15	44.405	0.888	39.432
IN'MEDIATE STRRP TRANS.	AM60	0.458 0.720 0.458	O.L=0.12 37	12	2.596	0.00	2.596	11	28.553	0.888	25.355
	ABUTMENT 2 HIGH COLUMN										
MAIN REIN. NEAR SD.	AH1	0.300 5.094	12	32	5.394	0.00	5.394	7	37.758	6.313	238.366
MAIN REIN. FAR SIDE	AH2	0.300 5.519	10	25	5.819	0.00	5.819	8	46.555	3.854	179.422
REIN. SIDE BARS	AH3	0.300 5.094	as	25	5.394	0.00	5.394	8	43.152	3.854	166.308
REIN. SIDE BARS	AH4	0.300 2.888	as	16	3.188	0.00	3.188	2	6.375	1.580	10.073
EXTERNAL STIRRUPS	AH5 to 32	0.96:1.377 0.720 0.96:1.377	O.L=0.12 15	14	4.017	0.00	4.017	28	112.485	1.210	136.107
IN'MEDIATE STRRP LONG.	AH33 to 60	0.96:1.377 0.360 0.96:1.377	O.L=0.12 15	12	3.297	0.00	3.297	28	92.325	0.888	81.985
IN'MEDIATE STRRP TRANS.	AH61	0.640 0.720 0.640	O.L=0.12 27	12	2.960	0.00	2.960	16	47.363	0.888	42.059
IN'MEDIATE STRRP TRANS.	AH62	0.459 0.720 0.459	O.L=0.12 37	12	2.598	0.00	2.598	12	31.177	0.888	27.686
									SUB TOTAL =		1,735.467

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD
Item : 50201 REINFORCED STEEL Grade 60
Bridge No. 1
Abutment Column

Page: 9 of 13
Drwg. No. _____

TOTAL WEIGHT OF STEEL PER BAR DIAMETER

-

S U M M A R Y

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	1,107.720
14	996.413
16	70.107
18	
20	
22	
25	2,418.391
28	
30	
32	1,678.109
36	
TOTAL =	**6,270.740**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	
16	
18	
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**0.000**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Bridge No. 1

Abutment Cap

Page: 10 of 13

Drwg. No. _____

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
MAIN REIN. BOTTOM	ACAP-001	1.088 7.050	15	25	8.138	0.00	8.138	32	260.416	3.854	1003.643
MAIN REIN. BOTTOM	ACAP-002	9.857	30	25	9.857	0.00	9.857	8	78.857	3.854	303.915
MAIN REIN. TOP	ACAP-003	1.088 10.410	15	32	11.498	0.00	11.498	16	183.968	6.313	1161.390
MAIN REIN. TOP	ACAP-004	1.088 4.110	15	32	5.198	0.00	5.198	16	83.168	6.313	525.040
MAIN REIN. TOP	ACAP-005	12.000	25	32	12.000	0.00	12.000	8	96.000	6.313	606.048
SIDE BARS	ACAP-006	12.000	28	18	12.000	0.00	12.000	20	240.000	2.000	480.000
SIDE BAR CLOSER RIGHT	ACAP-007	X = 1.500 1.045	28	18	4.045	0.00	4.045	10	40.450	2.000	80.900
SIDE BAR CLOSER LEFT	ACAP-008	X = 1.500 1.045	28	18	2.545	0.00	2.545	10	25.450	2.000	50.900
EXTERNAL STIRRUPS	ACAP-009	1.070 1.120 1.070	O.L=0.12 15	16	4.620	0.00	4.620	170	785.400	1.580	1240.932
INTERMEDIATE STIRRUPS	ACAP-010	0.713 1.120 0.713	O.L=0.12 15	14	3.907	0.00	3.907	170	664.133	1.210	803.601
INTERNAL STIRRUPS	ACAP-011	0.357 1.120 0.357	O.L=0.12 15	14	3.193	0.00	3.193	170	542.867	1.210	656.869
PLINTH VERTICAL	ACAP-012	X = 0.500 0.520	12	12	1.520	0.00	1.520	70	106.400	0.888	94.483
PLINTH VERTICAL	ACAP-013	X = 0.500 0.420	15	12	1.420	0.00	1.420	84	119.280	0.888	105.921
									SUB TOTAL =		7,113.642

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 11 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment Cap

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
PLINTH HORIZON TAL	ACAP-014	X = 0.370 0.520	18	12	1.260	0.00	1.260	112	141.120	0.888	125.315
BACK WALL VERTICAL	ACAP-015	2.590 0.170 2.590	15	14	5.350	0.00	5.350	170	909.500	1.210	1100.495
BACK WALL HOR'TAL	ACAP-016	0.170 11.772	28	12	11.942	0.00	11.942	24	286.608	0.888	254.508
BACK WALL HOR'TAL	ACAP-017	0.170 1.628	28	12	1.798	0.00	1.798	24	43.152	0.888	38.319
B. WALL APP. SLB DOWELS	ACAP-018	0.400 0.400 0.200	32	25	0.400	0.00	0.400	82	32.800	3.854	126.411
BACK WALL BRACKET	ACAP-019	0.30 0.420 0.193 0.574 0.30	14	14	1.787	0.00	1.787	170	303.790	1.210	367.586
W.W. RIGHT BOTTOM	ACAP-020	0.738 3.281 1.667	as	18	5.686	0.00	5.686	8	45.488	2.000	90.976
W.W. RIGHT TOP	ACAP-021	1.950 3.420	as	25	5.370	0.00	5.370	8	42.960	3.854	165.568
W.W. RIGHT TOP	ACAP-022	2.310 2.500	as	25	4.810	0.00	4.810	4	19.240	3.854	74.151
W.W. RT HOR. FAR FACE	ACAP-023	0.300 3.420	15	20	3.720	0.00	3.720	10	37.200	2.470	91.884
W.W. RT HOR. FAR FACE	ACAP-024 to 27	0.300 3.360:2.737	15	20	3.349	0.00	3.349	8	26.788	2.470	66.167
W.W. RT HOR. FAR FACE	ACAP-028 to 36	0.300 3.511:1.720	15	20	2.896	0.00	2.896	18	52.120	2.470	128.737
W.W. RT HOR. NE-AR FACE	ACAP-037	0.300 3.420	15	16	3.720	0.00	3.720	10	37.200	1.580	58.776
									SUB TOTAL =	**2,688.893**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Bridge No. 1

Abutment Cap

Page: 12 of 13

Drwg. No. _____

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
W.W. RT HOR. NE-AR FACE	ACAP-038 to 41	0.300 3.360:2.737	15	16	3.349	0.00	3.349	8	26.788	1.580	42.325
W.W. RT HOR. NE-AR FACE	ACAP-042 to 50	0.300 3.511:1.720	15	16	2.896	0.00	2.896	18	52.120	1.580	82.350
W.W. RT VER. N & FAR FACE	ACAP-051 to 68	X = 0.300 0.76:2.67	15	14	2.315	0.00	2.315	72	166.680	1.210	201.683
W.W. RT VER. N & FAR FACE	ACAP-69	X = 0.300 2.670	15	14	3.270	0.00	3.270	20	65.400	1.210	79.134
SIDE WALL VERT.	ACAP-070	2.245 0.170 2.245	15	12	4.660	0.00	4.660	28	130.480	0.888	115.866
SIDE WALL HOR.	ACAP-071	1.900 0.170 1.900	14	12	3.970	0.00	3.970	32	127.040	0.888	112.812
W.W. LEFT BOTTOM	ACAP-072	0.738 3.281 1.667	as	18	5.686	0.00	5.686	8	45.488	2.000	90.976
W.W. LEFT TOP	ACAP-073	1.950 3.420	as	25	5.370	0.00	5.370	8	42.960	3.854	165.568
W.W. LEFT TOP	ACAP-074	2.310 2.500	as	25	4.810	0.00	4.810	4	19.240	3.854	74.151
W.W. LT HOR. FAR FACE	ACAP-075	0.300 3.420	15	20	3.720	0.00	3.720	10	37.200	2.470	91.884
W.W. LT HOR. FAR FACE	ACAP-076 to 79	0.300 3.360:2.737	15	20	3.349	0.00	3.349	8	26.788	2.470	66.167
W.W. LT HOR. FAR FACE	ACAP-080 to 88	0.300 3.511:1.720	15	20	2.916	0.00	2.916	18	52.480	2.470	129.627
W.W. LT HOR. NE-AR FACE	ACAP-089	0.300 3.420	15	16	3.720	0.00	3.720	10	37.200	1.580	58.776
										SUB TOTAL =	**1,311.318**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Bridge No. 1

Abutment Cap

Page: 13 of 13

Drwg. No. _____

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
W.W. LT HOR. NE-AR FACE	ACAP-090 to 93	0.300 3.360:2.737	15	16	3.349	0.00	3.349	8	26.788	1.580	42.325
W.W. LT HOR. NE-AR FACE	ACAP-094 to 102	0.300 3.511:1.720	15	16	2.916	0.00	2.916	18	52.480	1.580	82.919
W.W. LT VER. N & FAR FACE	ACAP-103 to 120	X = 0.300 0.76:2.67	15	14	2.315	0.00	2.315	72	166.680	1.210	201.683
W.W. LT VER. N & FAR FACE	ACAP-121	X = 0.300 2.670	15	14	3.270	0.00	3.270	20	65.400	1.210	79.134
Spacer Top	ACAP-122	1.000	130	32	1.000	0.00	1.000	20	20.000	6.313	126.260
Spacer Bottom	ACAP-123	1.000	130	25	1.000	0.00	1.000	20	20.000	3.854	77.080
										SUB TOTAL =	609.401

S U M M A R Y

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	847.223
14	3,490.185
16	1,608.404
18	793.752
20	574.466
22	
25	1,913.407
28	
30	
32	2,292.478
36	
TOTAL =	11,519.914

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	
16	
18	
20	
22	
25	77.080
28	
30	
32	126.260
36	
TOTAL =	203.340

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 1 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

PRE-CAST GIRDER

Girder Dimensions:

W =	1.780 m.	H1 =	0.060 m.	No. of Girder per span	= 7
W1 =	0.590 m.	H2 =	0.129 m.	No. of edge Girder per span	= 2
W2 =	0.600 m.	H3 =	0.120 m.	No. of mid Girder per span	= 5
W3 =	0.500 m.	H4 =	1.080 m.	No. of span	= 3
S.E. =	-1.500 %	L1 =	19.900 m.	Top Slab Thickness	= 0.18
		L2 =	19.300 m.		

SIDE ELEVATION

SECTION A - A

P L A N

LONGITUDINAL SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 2 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

PRE-CAST GIRDER

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BOTTOM 1ST LAYER A	G1	1.000 / 8.200	15	32	9.200	0.00	9.200	84	772.804	6.313	4878.712
BOTTOM 1ST LAYER A	G2	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 1ST LAYER A	G3	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 1ST LAYER B	G4	1.000 / 8.200	15	32	9.200	0.00	9.200	84	772.804	6.313	4878.712
BOTTOM 1ST LAYER B	G5	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 1ST LAYER B	G6	3.580	15	32	3.580	0.00	3.580	84	300.708	6.313	1898.369
BOTTOM 2ND LAYER C	G7	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 2ND LAYER C	G8	5.200	15	32	5.200	0.00	5.200	168	873.610	6.313	5515.100
BOTTOM 2ND LAYER D	G9	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 2ND LAYER D	G10	5.200	15	32	5.200	0.00	5.200	84	436.805	6.313	2757.550
BOTTOM 3RD LAYER E	G11	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 3RD LAYER E	G12	5.200	15	32	5.200	0.00	5.200	84	436.805	6.313	2757.550
BOTTOM 3RD LAYER F	G13	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
SIDE BARS	G14	12	12	18	12.000	0.00	12.000	210	2520.000	2.000	5040.000
SIDE BARS	G15	8.550	12	18	8.550	0.00	8.550	210	1795.500	2.000	3591.000
									SUB TOTAL =		75,861.522

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

PRE-CAST GIRDER

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SIDE BARS CLOSER	G16	1.200 0.429 1.200	as	18	2.829	0.00	2.829	42	118.813	2.000	237.627
SIDE BARS CLOSER	G17	1.200 0.443 1.200	as	18	2.843	0.00	2.843	42	119.397	2.000	238.793
SIDE BARS CLOSER	G18	1.200 0.457 1.200	as	18	2.857	0.00	2.857	42	119.980	2.000	239.960
SIDE BARS CLOSER	G19	1.200 0.471 1.200	as	18	2.871	0.00	2.871	84	241.127	2.000	482.253
SIDE BARS CLOSER	G20	1.200 0.484 1.200	as	18	2.884	0.00	2.884	84	242.293	2.000	484.587
TOP REINFOR CEMENT	G21	1.000 10.800	18	32	11.800	0.00	11.800	210	2478.000	6.313	15643.614
EXTERNA L STIRRUPS	G22	0.526 1.105 1.097 0.425	O.L=0.12 12.5	16	3.393	0.00	3.393	1680	5700.240	1.580	9006.379
INTERNAL STIRRUPS	G23	1.270 0.240 1.097 1.270	O.L=0.12 12.5	16	3.260	0.00	3.260	1680	5476.800	1.580	8653.344
MID-SPAN STIRRUPS	G24	0.526 1.105 1.097 0.425	O.L=0.12 15	14	3.393	0.00	3.393	1344	4560.192	1.210	5517.832
MID-SPAN STIRRUPS	G25	1.270 0.240 1.270	O.L=0.12 15	16	3.260	0.00	3.260	1344	4381.440	1.580	6922.675
TOP FLANGE DOWELS	G26	0.350 0.180 0.85	15	12	1.380	0.00	1.380	2646	3651.480	0.888	3242.514
TOP FLANGE DOWELS	G27	0.350 0.180 0.85	15	12	1.380	0.00	1.380	2646	3651.480	0.888	3242.514
T. F. D. IN'R EDGE GIRDER	G28	0.350 0.180 0.85	as	12	1.380	0.00	1.380	12	16.560	0.888	14.705
T. F. D. OUT'R E. GIRDER	G29	0.350 0.180 0.85	as	12	1.380	0.00	1.380	12	16.560	0.888	14.705
TOP FLANGE TRANSVE RSE	G30	1.700	15	12	1.700	0.00	1.700	2667	4533.900	0.888	4026.103
									SUB TOTAL =		57,967.607

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF-BAHA-ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 4 of 4

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

PRE-CAST GIRDER

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
T. F. TR. OUT'R E. GIRDER	G30 '	0.500 1.100	as	12	1.600	0.00	1.600	48	76.800	0.888	68.198
TOP FLANGE	G31	12.000	15	10	12.000	0.00	12.000	420	5040.000	0.617	3109.680
TOP FLANGE	G32	8.050	15	10	8.050	0.00	8.050	420	3381.000	0.617	2086.077
LIFTING LUG	G33	0.55 0.90 0.32	as	25	1.770	0.00	1.770	168	297.360	3.854	1146.025
DIAPH DOWEL EXT. G'DER	G34	1.160 0.500 0.44	as	20	2.100	0.00	2.100	48	100.800	2.470	248.976
DIAPH DOWEL INT. G'DER	G35	1.160 0.44	as	20	2.760	0.00	2.760	120	331.200	2.470	818.064
Spacer	G36	0.400	as	20	0.400	0.00	0.400	630	252.000	2.470	622.440
									SUB TOTAL =	**8,099.461**	

S U M M A R Y

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	5,195.757
12	10,608.741
14	5,517.832
16	24,582.398
18	10,314.220
20	1,067.040
22	
25	1,146.025
28	
30	
32	82,874.136
36	
TOTAL =	**141,306.149**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	
16	
18	
20	622.440
22	
25	
28	
30	
32	
36	
TOTAL =	**622.440**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 1 of 3

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge 1

S L A B

Slab Dimension:

L = 19.90 m.
W = 12.70 m.
T = 0.18 m.

No. of Slabs = 3

Diaphragm Dimension:

L = 1.32 m.
W = 0.30 m.
H = 1.00 m.

P L A N

TOP DIAPHRAGM DETAILS
SCALE: 1:50

SECTION FOR TOP SLAB REINFOFCEMENT
SCALE: 1:50

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 2 of 3

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

S L A B

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
LONGITUDINAL BOTTOM	SL1	0.100 11.900	15	14	12.000	0.00	12.000	192	2304.000	1.210	2787.840
LONGITUDINAL BOTTOM	SL2	0.100 8.760	15	14	8.860	0.00	8.860	192	1701.120	1.210	2058.355
TRANSVERSE BOTTOM	SL3	0.100 5.528	12.5	16	5.628	0.00	5.628	480	2701.440	1.580	758.400
TRANSVERSE BOTTOM	SL4	0.100 8.052	12.5	16	8.152	0.00	8.152	480	3912.960	1.580	6182.477
TRANSVERSE TOP	SL5	5.528	12.5	16	5.528	0.00	5.528	480	2653.440	1.580	4192.435
TRANSVERSE TOP	SL6	8.052	12.5	16	8.052	0.00	8.052	480	3864.960	1.580	6106.637
LONGITUDINAL TOP	SL7	0.100 4.990	15	18	5.090	0.00	5.090	510	2595.900	2.000	5191.800
LONGITUDINAL TOP	SL8	12.000	15	14	12.000	0.00	12.000	255	3060.000	1.210	3702.600
NEW JERSEY DOWELS	SL9	0.750 0.900 0.30 0.38	15	16	2.330	0.00	2.330	798	1859.340	1.580	2937.757
Chairs	SL10	0.200 0.060 0.200	as	12	0.720	0.00	0.720	150	108.000	0.888	95.904
									SUB TOTAL =	**34,014.205**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 3 of 3

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

D I A P H R A G M

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
DIAPHRAGM STIRRUP	DP1	0.240 0.940 0.240	O.L=0.10 15	14	2.560	0.00	2.560	360	921.600	1.210	1115.136
DIAPHRAGM LONGITUDINAL TOP	DP2	0.100 8.334	as	25	8.434	0.00	8.434	24	202.416	3.854	780.111
DIAPHRAGM LONGITUDINAL TOP	DP3	0.100 5.806	as	25	5.906	0.00	5.906	24	141.744	3.854	92.496
DIAPHRAGM SIDE BARS	DP4	1.240	15	14	1.240	0.00	1.240	288	357.120	1.210	432.115
									SUB TOTAL =		**2,419.858**

S U M M A R Y

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	10,096.046
16	20,177.706
18	5,191.800
20	
22	
25	872.607
28	
30	
32	
36	
TOTAL =	**36,338.160**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	95.904
14	-
16	
18	
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**95.904**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 1 of 2

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge 1

S L A B

Slab Dimension:

L = 11.82 m.

W = 4.00 m.

T = 0.30 m.

No. of App. Slabs = 2

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: 2 of 2

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

APPROACH SLAB

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BOTTOM TRANSVERSE	APSL 1	X = 0.240 3.940	15	20	4.420	0.00	4.420	158	698.360	2.470	1724.949
BOTTOM LONGITUDINAL	APSL 2	X = 0.150 11.700	15	16	12.000	0.00	12.000	54	648.000	1.580	1023.840
TOP LONGITUDINAL	APSL 3	X = 0.150 11.700	15	16	12.000	0.00	12.000	54	648.000	1.580	85.320
TOP TRANSVERSE	APSL 4	X = 0.240 3.940	15	20	4.420	0.00	4.420	158	698.360	2.470	1724.949
Chairs	APSL 5	0.400 0.168 0.400	as	12	1.536	0.00	1.536	20	30.720	0.888	27.279
										SUB TOTAL =	**4,586.338**

SUMMARY

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	
16	1,109.160
18	
20	3,449.898
22	
25	
28	
30	
32	
36	
TOTAL =	**4,559.058**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	27.279
14	
16	
18	
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**27.279**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : **51201** **WATER PROOF MEMBRANE** Drwg. No. _____

Type of Water Proof Membrane = _____

Dimension of Deck Slab = 12.70 x 19.90

Number of Span = 3.00

Dimension of Exp. Joint = 0.24 x 11.97

Total Number of Exp. Joint = 4.00

Total Area of W.P. Membrane = **746.699** m²

	No. of span / exp. Joint	LENGTH (m)	WIDTH (m)	AREA (m²)	REMARKS
W.P. Membrane	3.00	19.90	12.70	758.190	
Exp. Joint	4.00	11.97	0.24	11.491	
		TOTAL =		**746.699**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : **5031401** **EXPANSION JOINT** Drwg. No. _____

Type of Expansion Joint = _____

Dimension of Exp. Joint = 0.24 x 11.97

Total Number of Exp. Joint = 4.00

Total Length = **47.880** m

EXPANSION JOINT TABLE			
Model	Dimensions (mm)		
	A	B	L
REJ-42	35	240	2000
REJ-52	40	270	1828
REJ-70	45	355	1828
REJ-80	54	430	1828

	No. of Exp. Joint	Each Length (m)	Total Length (m)	REMARKS
Exp. Joint	4.00	11.97	**47.88**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : **5031104** **BEARING DEVICE** Drwg. No. _____

Type of Bearing Device = _____

No. of Pier = 2.00

No. of Abutment = 2.00

No. of Span = 3.00

No. of Girder per Span = 7.00

Total no. of Bearing = **42** pcs.

	No. of Pier	No. of Abutment	No. of Girder per Span	TOTAL (pcs)	REMARKS
Bearing Device	2.00	2.00	7.00	**42.00**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : **51001** **BRIDGE PARAPET** Drwg. No. _____

Length per Span = 19.90
Number of Span = 3.00
Length of Abut. Wing Wall = 3.50
No. of Sides = 2.00
Total Length of Parapet = **133.400** m

PARAPET
OVER WING WALL

	Length per Span (m)	No. of Span (unit)	Length of Abut. Wing Wall (m)	Total Length (m)	REMARKS
PARAPET	19.90	3.00	3.50	133.400	
		TOTAL LENGTH =		**133.400**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: _1__ of __2__

Item : *2090101* STRUCTURAL EXCAVATION @ PIER — Drwg. No. _____

Pier Foundation

Length =	11.000	m.
Width =	5.000	m.
Height =	1.500	m.
EXC. W. =	0.300	m.
Blinding =	0.100	m.
Pier C.Dia. =	1.200	m.
NO.OF PIERS	2	

	LOCATION	Depth	Width	Area	Distance	Volume	Remarks
PIER 1	Sect. A-A	2.870	5.600	16.072	11.600	202.602	
	Sect. B-B	3.430		19.208			
	Sect. C-C	3.057		17.117			
PIER 2	Sect. A-A	3.707	5.600	20.757	11.600	234.649	
	Sect. B-B	3.530		19.768			
	Sect. C-C	3.600		20.160			
					TOTAL =	437.250	m³

PIER 1 - Natural Ground Levels					
Offset	-10.000	-5.000	0.000	5.000	10.000
Elevation	2142.950	2142.900	2143.500	2143.152	2143.025

PIER 2 - Natural Ground Levels					
Offset	-10.000	-5.000	0.000	5.000	10.000
Elevation	2143.152	2143.025	2142.950	2142.900	2143.500

PIER 1 - FOUNDATION TOP SURFACE LEVELS					
Offset	-5.500	-2.750	0.000	2.750	5.500
Elevation	2141.670	2141.670	2141.670	2141.670	2141.670

PIER 2 - FOUNDATION TOP SURFACE LEVELS					
Offset	-5.500	-2.750	0.000	2.750	5.500
Elevation	2141.020	2141.020	2141.020	2141.020	2141.020

PIER FOUNDATION SIDE ELEVATION

PIER FOUNDATION PLAN

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING TAIF-BAHA-ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: _2__ of __2__

Item : *2090101* STRUCTURAL EXCAVATION @ ABUTMENT — Drwg. No. _____

ABUTMENT FOUNDATION

LOC'N	Length	Width	Thickness
ABT-1	13.000	6.000	1.200
ABT-2	13.000	5.000	1.100

EXC. W. =	0.300	m.
Blinding =	0.100	m.
NO.OF ABUT.	2	

	LOCATION	Depth	Width	Area	Distance	Volume	Remarks
ABUT. 1	Sect. A-A	2.730	6.600	18.018	13.600	219.314	
	Sect. B-B	2.580		17.028			
	Sect. C-C	2.020		13.332			
ABUT. 2	Sect. A-A	1.224	5.600	6.854	13.600	103.933	
	Sect. B-B	1.442		8.075			
	Sect. C-C	1.428		7.997			
					TOTAL =	323.247	m³

ABUT. 1 - Natural Ground Levels					
Offset	-10.000	-5.000	0.000	5.000	10.000
Elevation	2145.000	2145.200	2144.890	2144.200	2144.850

ABUT. 2 - Natural Ground Levels					
Offset	-10.000	-5.000	0.000	5.000	10.000
Elevation	2144.400	2144.560	2144.650	2144.570	2144.900

ABUT. 1 - FOUNDATION TOP SURFACE LEVELS					
Offset	-6.500	-3.250	0.000	3.250	6.500
Elevation	2143.610	2143.610	2143.610	2143.610	2143.610

ABUT. 2 - FOUNDATION TOP SURFACE LEVELS					
Offset	-6.500	-3.250	0.000	3.250	6.500
Elevation	2144.408	2144.408	2144.408	2144.408	2144.408

ABUTMENT FOUNDATION SIDE ELEVATION

ABUTMENT FOUNDATION PLAN

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING TAIF-BAHA-ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 1 of 1

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge 1

TOTAL WEIGHT OF STEEL PER BAR DIAMETER

-

S U M M A R Y

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	0.000
10	5,195.757
12	14,276.025
14	22,582.177
16	50,096.537
18	19,601.072
20	8,682.078
22	0.000
25	28,547.737
28	0.000
30	0.000
32	106,902.812
36	0.000
TOTAL =	**255,884.19**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	0.000
10	0.000
12	123.183
14	282.075
16	376.571
18	0.000
20	622.440
22	0.000
25	77.080
28	0.000
30	0.000
32	656.552
36	0.000
TOTAL =	**2,137.90**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 7

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Bridge No. 1

Pier Foundation, Column & Cap

Pier Dimensions:

Location	Length m.	Width m.	Height m.	Diameter m.
Pier Foundation	11.000	5.000	1.500	
Pier 1 Column 1			7.700	1.200
Pier 1 Column 2			7.489	1.200
Pier 2 Column 1			7.896	1.200
Pier 2 Column 2			7.685	1.200

Superelevation =	-3.20%
No. of Pier =	2
No. of Column =	4
No. of Pier Cap =	2
No. of Cap Plinth =	14

Location	W1 m.	W2 m.	W3 m.	H1 m.	H2 m.	L1 m.	L2 m.
Pier Cap	0.250	1.285	1.526	0.700	0.500	12.680	0.500
Pier Cap Plinth	0.500	0.650	0.700	0.100	0.075	0.600	0.775
Pier Cap Sidings	2.026	1.785		1.200		0.250	

SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 7

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Pier Foundation

Pier Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
LONGITUDINAL BOTTOM	PF1 O.L=60xØ/2	1.363 8.004	17	25	9.367	0.00	9.367	60	561.990	3.854	2165.909
LONGITUDINAL BOTTOM	PF2 O.L=60xØ/2	1.363 4.371	17	25	5.734	0.00	5.734	60	344.010	3.854	1325.815
TRANSVERSE BOTTOM	PF3	X = 1.322 4.890	15	20	7.534	0.00	7.534	146	1099.964	2.470	2716.911
DINAL SIDE BARS	PF4	10.85	28	16	10.850	0.00	10.850	12	130.200	1.580	205.716
TRANSVERSE SIDE BARS	PF5	X = 1.060 4.812	28	16	4.812	0.00	4.812	12	57.744	1.580	91.236
LONGITUDINAL TOP	PF6	10.900	13	25	10.900	0.00	10.900	80	872.000	3.854	3360.688
TRANSVERSE TOP	PF7	4.900	15	18	4.900	0.00	4.900	146	715.400	2.000	1430.800
COLUMN STARTER	PF8	0.400 3.589	12	32	3.989	0.00	3.989	112	446.768	6.313	2820.446
STIRRUP CIRCULAR	PF9	D=1.09 O.L=0.20	20	12	3.618	0.00	3.618	32	115.778	0.888	102.811
CHAIRS	PF14	0.400 1.262 0.400	as	16	3.724	0.00	3.724	64	238.336	1.580	376.571
									SUB TOTAL =		**14,596.903**

Main Reinforcement		**Chairs & Spacers**	
BAR SIZE	**WEIGHT (kg)**	**BAR SIZE**	**WEIGHT (kg)**
8		8	
10		10	
12	102.811	12	
14		14	
16	296.952	16	376.571
18	1,430.800	18	
20	2,716.911	20	
22		22	
25	6,852.412	25	
28		28	
30		30	
32	2,820.446	32	
36		36	
TOTAL =	**14,220.332**	**TOTAL =**	**376.571**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Page: 3 of 7

Item : 50201 REINFORCED STEEL Grade 60

Drwg. No. _____

Bridge No. 1

Pier Column

Pier Column

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
PIER 1 COLUMN											
SHORT COLUMN LEFT	P1C1	0.300 8.700	12	32	9.000	0.00	9.000	28	252.000	6.313	1590.876
HIGH COLUMN RIGHT	P1C2	0.300 8.489	12	32	8.789	0.00	8.789	28	246.092	6.313	1553.579
COLUMN STIRRUP CIRCULAR	P1ST	D=1.11 O.L=0.20	15	12	3.681	0.00	3.681	102	375.451	0.888	333.401
PIER 2 COLUMN											
SHORT COLUMN LEFT	P2C1	0.300 8.896	12	32	9.196	0.00	9.196	28	257.488	6.313	1625.522
HIGH COLUMN RIGHT	P2C2	0.300 8.685	12	32	8.985	0.00	8.985	28	251.580	6.313	1588.225
COLUMN STIRRUP CIRCULAR	P2ST	D=1.11 O.L=0.20	15	12	3.681	0.00	3.681	104	382.813	0.888	339.938
									SUB TOTAL =	**7,031.539**	

Main Reinforcement		Chairs & Spacers	
BAR SIZE	**WEIGHT (kg)**	**BAR SIZE**	**WEIGHT (kg)**
8		8	
10		10	
12	673.338	12	
14		14	
16		16	
18		18	
20		20	
22		22	
25		25	
28		28	
30		30	
32	6,358.201	32	
36		36	
TOTAL =	**7,031.539**	**TOTAL =**	**0.000**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60
Bridge No. 1
Pier Cap

Page: 4 of 7

Drwg. No. _____

Pier Cap

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
MAIN REIN. BOTTOM	PCAP-001	11.680	13	32	11.680	0.00	11.680	24	280.320	6.313	1769.660
MAIN REIN. BOTTOM	PCAP-002	10.440	13	32	10.440	0.00	10.440	24	250.560	6.313	1581.785
MAIN REIN. TOP	PCAP-003	12.000	10	32	12.000	0.00	12.000	32	384.000	6.313	2424.192
LEFT CANTILEVER	PCAP-004	5.504 0.588 0.651 1.884	28	32	8.627	0.00	8.627	24	207.037	6.313	1307.024
RIGHT CANTILEVER	PCAP-005	5.504 0.588 1.884	as	32	7.976	0.00	7.976	8	63.808	6.313	402.820
RIGHT CANTILEVER	PCAP-006	5.504 0.588 1.884 0.707	28	32	8.683	0.00	8.683	24	208.395	6.313	1315.595
LEFT CANTILEVER	PCAP-007	5.504 0.588 1.884	as	32	7.976	0.00	7.976	8	63.808	6.313	402.820
SIDE BARS	PCAP-008	12.00	20	20	12.000	0.00	12.000	16	192.000	2.470	474.240
SIDE BAR BOTTOM	PCAP-009	11.68	as	20	11.680	0.00	11.680	4	46.720	2.470	115.398
SIDE BAR CLOSER RIGHT	PCAP-010	X = 2.000 1.685	as	20	5.685	0.00	5.685	6	34.110	2.470	84.252
SIDE BAR CLOSER RIGHT	PCAP-011	X = 2.000 1.618	as	20	5.618	0.00	5.618	2	11.236	2.470	27.753
SIDE BAR CLOSER RIGHT	PCAP-012	X = 2.000 1.452	as	20	5.452	0.00	5.452	2	10.904	2.470	26.933
									SUB TOTAL =	**9,932.472**	

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 5 of 7

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Pier Cap

Pier Cap

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SIDE BAR CLOSER LEFT	PCAP-013	X = 2.000 1.946	as	20	5.946	0.00	5.946	6	35.676	2.470	88.120
SIDE BAR CLOSER LEFT	PCAP-014	X = 2.000 1.859	as	20	5.859	0.00	5.859	2	11.718	2.470	28.943
SIDE BAR CLOSER LEFT	PCAP-015	X = 2.000 1.693	as	20	5.693	0.00	5.693	2	11.386	2.470	28.123
EXT'NAL STIRRUPS	PCAP-016 to 111	1.669 :1.910 0.652 1.285 :1.526	O.L=0.12 12 0.506	16	5.810	0.00	5.810	192	1115.584	1.580	1762.623
EXT'NAL STIRRUPS RT. END	PCAP-112	1.729 0.652 1.618	O.L=0.12 as 0.186	16	5.264	0.00	5.264	2	10.527	1.580	16.633
EXT'NAL STIRRUPS RT. END	PCAP-113	1.729 0.652 1.452	O.L=0.12 as 0.344	16	5.412	0.00	5.412	2	10.824	1.580	17.103
INTERMEDIATE STRP RT. END	PCAP-114	1.729 0.652 1.729	O.L=0.12 as	16	5.002	0.00	5.002	2	10.004	1.580	15.806
EXT'NAL STIRRUPS LT. END	PCAP-115	1.970 0.652 1.859	O.L=0.12 as 0.186	16	5.746	0.00	5.746	2	11.491	1.580	18.156
EXT'NAL STIRRUPS LT. END	PCAP-116	1.970 0.652 1.693	O.L=0.12 as 0.344	16	5.894	0.00	5.894	2	11.788	1.580	18.626
INTERMEDIATE STRP LT. END	PCAP-117	1.970 0.652 1.970	O.L=0.12 as	16	5.484	0.00	5.484	2	10.968	1.580	17.329
INTERMEDIATE STIRRUPS	PCAP-118 to 213	1.296 :1.515 0.992 1.296 :1.515	O.L=0.12 12	14	5.035	0.00	5.035	192	966.720	1.210	1169.731
INTERMEDIATE STRP RT. END	PCAP-214	1.293 0.952 1.293	O.L=0.12 as	14	4.730	0.00	4.730	2	9.461	1.210	11.448
									SUB TOTAL =	**3,192.642**	

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Page: 6 of 7

Item : 50201 REINFORCED STEEL Grade 60

Drwg. No. _____

Bridge No. 1

Pier Cap

Pier Cap

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
INTERMEDIATE STRP RT. END	PCAP-215	1.290 / 0.785 / 1.290	O.L=0.12 as	14	4.391	0.00	4.391	2	8.782	1.210	10.626
INTERMEDIATE STRP RT. END	PCAP-216	1.285 / 0.619 / 1.285	O.L=0.12 as	14	4.047	0.00	4.047	2	8.095	1.210	9.795
INTERMEDIATE STRP LT. END	PCAP-217	1.518 / 0.952 / 1.518	O.L=0.12 as	14	5.180	0.00	5.180	2	10.359	1.210	12.534
INTERMEDIATE STRP LT. END	PCAP-218	1.521 / 0.785 / 1.521	O.L=0.12 as	14	4.853	0.00	4.853	2	9.705	1.210	11.743
INTERMEDIATE STRP LT. END	PCAP-219	1.526 / 0.619 / 1.526	O.L=0.12 as	14	4.529	0.00	4.529	2	9.059	1.210	10.961
INTERNAL STIRRUPS	PCAP-220 to 315	0.432 : 0.505 / 0.992 / 0.432 : 0.505	O.L=0.12 12	14	3.161	0.00	3.161	192	606.912	1.210	734.364
INTERNAL STIRRUPS RT END	PCAP-316	0.432 / 0.952 / 0.432	O.L=0.12 as	14	3.008	0.00	3.008	2	6.017	1.210	7.280
INTERNAL STIRRUPS RT END	PCAP-317	0.432 / 0.785 / 0.432	O.L=0.12 as	14	2.675	0.00	2.675	2	5.350	1.210	6.473
INTERNAL STIRRUPS RT END	PCAP-318	0.432 / 0.619 / 0.432	O.L=0.12 as	14	2.342	0.00	2.342	2	4.683	1.210	5.667
INTERNAL STIRRUPS LT END	PCAP-319	0.505 / 0.952 / 0.505	O.L=0.12 as	14	3.154	0.00	3.154	2	6.307	1.210	7.632
INTERNAL STIRRUPS LT END	PCAP-320	0.505 / 0.785 / 0.505	O.L=0.12 as	14	2.820	0.00	2.820	2	5.641	1.210	6.825
INTERNAL STIRRUPS LT END	PCAP-321	0.505 / 0.619 / 0.505	O.L=0.12 as	14	2.487	0.00	2.487	2	4.974	1.210	6.019
									SUB TOTAL =		829.918

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 7 of 7

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

Pier Cap Plinth & Sidings

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
PLINTH VERTICAL	PCAP-322	X = 0.500 0.520	7	12	1.520	0.00	1.520	140	212.800	0.888	188.966
PLINTH VERTICAL	PCAP-323	X = 0.500 0.420	5	12	1.420	0.00	1.420	168	238.560	0.888	211.841
PLINTH HORIZON TAL	PCAP-324	X = 0.400 0.520	6	12	1.320	0.00	1.320	224	295.680	0.888	262.564
SIDE WALL RT SIDE VTL	PCAP-325	0.170 1.760 0.500 0.10	1.640 15 0.68	14	4.950	0.00	4.950	24	116.410	1.210	140.857
SIDE WALL RT SIDE HTL	PCAP-326	0.170 1.705	23	12	1.875	0.00	1.875	32	60.000	0.888	53.280
SIDE WALL LT SIDE VTL	1.640 PCAP-327 0.68	0.170 1.760 0.10 0.500	15	14	4.950	0.00	4.950	28	138.600	1.210	167.706
SIDE WALL LT SIDE HTL	PCAP-328	0.170 1.946	23	12	2.116	0.00	2.116	32	67.712	0.888	60.128
SPACER BOTTOM	PCAP-329	1.500	as	32	1.500	0.00	1.500	24	36.000	6.313	227.268
SPACER TOP	PCAP-330	2.000	as	32	2.000	0.00	2.000	24	48.000	6.313	303.024
									SUB TOTAL =	**1,615.634**	

Main Reinforcement		Chairs & Spacers	
BAR SIZE	**WEIGHT (kg)**	**BAR SIZE**	**WEIGHT (kg)**
8		8	
10		10	
12	776.780	12	
14	2,319.660	14	
16	1,866.277	16	
18		18	
20	873.763	20	
22		22	
25		25	
28		28	
30		30	
32	9,203.896	32	530.292
36		36	
TOTAL =	**15,040.375**	**TOTAL =**	**530.292**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 13

Item : **50201 REINFORCED STEEL (Grade 60)** Drwg. No. _____

Bridge No. 1

Abutment Foundation, Column & Cap

Abutment Dimensions:

Location	L1 m.	L2 m.	W1 m.	W2 m.	H1 m.	H2
Abutment 1 Found'n	13.000		6.000		1.200	
Abutment 2 Found'n	13.000		5.000		1.100	
Abutment 1 Column 1	1.050	1.600	0.800		5.964	
Abutment 1 Column 2	1.050	1.600	0.800		6.108	
Abutment 1 Column 3	1.050	1.600	0.800		6.252	
Abutment 2 Column 1	1.050	1.600	0.800		3.806	
Abutment 2 Column 2	1.050	1.600	0.800		3.950	
Abutment 2 Column 3	1.050	1.600	0.800		4.094	
Abutment Cap	12.680		1.150	0.900	1.200	
Abutment Sidings	0.900		0.250		1.200	
Abutment Wing Wall	12.680		0.250		1.550	0.250
Abutment Back Wall	0.250	3.250	0.440	0.440	1.950	0.800
Abut't Cap Plinth	0.600	0.775	0.650	0.700	0.100	0.075

Superelevation =	-3.20%
No. of Abut't =	2
No. of Column =	6
No. of Abut't Cap =	2
No. of Cap Plinth =	14

SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 2 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment 1 Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BOTTOM TRANSVERSE TOE	AF1	X = 1.038 5.875	15	25	7.950	0.00	7.950	87	691.650	3.854	2665.619
BOTTOM LONGITUDINAL	AF2	1.038 5.0375	15	25	6.075	0.00	6.075	80	486.000	3.854	1873.044
BOTTOM LONGITUDINAL	AF3	5.800	15	25	5.800	0.00	5.800	40	232.000	3.854	894.128
SIDE BAR LONGITUDINAL	AF4	12.00	as	16	12.000	0.00	12.000	6	72.000	1.580	113.760
SIDE BAR TRANSVERSE	AF5	X = 1.500 5.834	as	16	8.834	0.00	8.834	6	53.004	1.580	83.746
TOP LONGITUDINAL	AF6	8.490	15	25	8.490	0.00	8.490	40	339.600	3.854	1308.818
TOP LONGITUDINAL	AF7	5.910	15	25	5.910	0.00	5.910	40	236.400	3.854	911.086
TOP TRANSVERSE HEEL	AF8	5.875	15	18	5.875	0.00	5.875	87	511.125	2.000	1022.250
COLUMN STARTER SIDE BAR	AF9	0.400 2.700	25	25	3.100	0.00	3.100	36	111.600	3.854	430.106
STARTER NEAR SDE	AF10	0.400 2.700	12	25	3.100	0.00	3.100	21	65.100	3.854	250.895
COLUMN STARTER FAR SDE	AF11	0.600 3.190	12	32	3.790	0.00	3.790	21	79.590	6.313	502.452
COL. REIN FAR SIDE	AF12-H	0.600 4.234	as	32	4.834	0.00	4.834	4	19.336	6.313	122.068
MID COL. REIN FAR SIDE	AF13-M	0.600 4.186	as	32	4.786	0.00	4.786	4	19.144	6.313	120.856
COL. REIN FAR SIDE	AF14-S	0.600 4.138	as	32	4.738	0.00	4.738	4	18.952	6.313	119.644
STR. STRRP PER.	AF15	1.387 0.700 1.387	O.L=0.10 as	14	4.374	0.00	4.374	3	13.122	1.210	15.877
									SUB TOTAL =		**10,434.350**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 3 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment 1 Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STR. STRRP PER.	AF16	1.409 / 0.700 / 1.409	O.L=0.10 as	14	4.419	0.00	4.419	3	13.257	1.210	16.041
STR. STRRP PER.	AF17	1.432 / 0.700 / 1.432	O.L=0.10 as	14	4.464	0.00	4.464	3	13.392	1.210	16.204
STR. STRRP PER.	AF18	1.454 / 0.700 / 1.454	O.L=0.10 as	14	4.509	0.00	4.509	3	13.527	1.210	16.368
STR. STRRP PER.	AF19	1.477 / 0.700 / 1.477	O.L=0.10 as	14	4.554	0.00	4.554	3	13.662	1.210	16.531
STR. STRRP TRANS.	AF20	0.320 / 0.700 / 0.320	O.L=0.10 25	12	2.240	0.00	2.240	15	33.600	0.888	29.837
STR. STRRP LONG.	AF21	1.387 / 0.340 / 1.387	O.L=0.10 as	12	3.654	0.00	3.654	3	10.962	0.888	9.734
STR. STRRP LONG.	AF22	1.409 / 0.340 / 1.409	O.L=0.10 as	12	3.699	0.00	3.699	3	11.097	0.888	9.854
STR. STRRP LONG.	AF23	1.432 / 0.340 / 1.432	O.L=0.10 as	12	3.744	0.00	3.744	3	11.232	0.888	9.974
STR. STRRP LONG.	AF24	1.454 / 0.340 / 1.454	O.L=0.10 as	12	3.789	0.00	3.789	3	11.367	0.888	10.094
STR. STRRP LONG.	AF25	1.477 / 0.340 / 1.477	O.L=0.10 as	12	3.834	0.00	3.834	3	11.502	0.888	10.214
CHAIR	PF14	0.400 / 0.857 / 0.400	as	14	2.914	0.00	2.914	40	116.560	1.210	141.038
									SUB TOTAL =	**285.887**	

Main Reinforcement		**Chairs & Spacers**	
BAR SIZE	**WEIGHT (kg)**	**BAR SIZE**	**WEIGHT (kg)**
8		8	
10		10	
12	79.706	12	
14	81.021	14	141.038
16	197.506	16	
18	1,022.250	18	
20		20	
22		22	
25	8,333.697	25	
28		28	
30		30	
32	865.020	32	
36		36	
TOTAL =	**10,579.200**	**TOTAL =**	**141.038**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 4 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment 2 Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BOTTOM TRANSVERSE TOE	AF1	X = 0.938 4.875	15	25	6.750	0.00	6.750	87	587.250	3.854	2263.262
BOTTOM LONGITUDINAL	AF2	0.938 5.038	15	25	5.975	0.00	5.975	66	394.350	3.854	1519.825
BOTTOM LONGITUDINAL	AF3	5.800	15	25	5.800	0.00	5.800	33	191.400	3.854	737.656
SIDE BAR LONGITUDINAL	AF4	12.00	as	16	12.000	0.00	12.000	6	72.000	1.580	113.760
SIDE BAR TRANSVERSE	AF5	X = 1.500 4.834	as	16	7.834	0.00	7.834	6	47.004	1.580	74.266
TOP LONGITUDINAL	AF6	8.490	15	25	8.490	0.00	8.490	33	280.170	3.854	1079.775
TOP LONGITUDINAL	AF7	5.910	15	25	5.910	0.00	5.910	33	195.030	3.854	751.646
TOP TRANSVERSE HEEL	AF8	4.875	15	18	4.875	0.00	4.875	87	424.125	2.000	848.250
COLUMN STARTER SIDE BAR	AF9	0.400 2.600	25	25	3.000	0.00	3.000	36	108.000	3.854	416.232
STARTER NEAR SDE	AF10	0.400 2.600	12	25	3.000	0.00	3.000	21	63.000	3.854	242.802
COLUMN STARTER FAR SDE	AF11	0.600 3.190	12	32	3.790	0.00	3.790	21	79.590	6.313	502.452
COL. REIN FAR SIDE	AF12-H	0.600 3.515	as	32	4.115	0.00	4.115	4	16.459	6.313	103.904
MID COL. REIN FAR SIDE	AF13-M	0.600 3.467	as	32	4.067	0.00	4.067	4	16.267	6.313	102.691
COL. REIN FAR SIDE	AF14-S	0.600 3.419	as	32	4.019	0.00	4.019	4	16.075	6.313	101.479
STR. STRRP PER.	AF15	1.387 0.700 1.387	O.L=0.10 as	14	4.374	0.00	4.374	3	13.122	1.210	15.877
									SUB TOTAL =		**8,873.876**

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 5 of 13

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

Abutment 2 Foundation

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
STR. STRRP PER.	AF16	1.409 / 0.700 / 1.409	O.L=0.10 as	14	4.419	0.00	4.419	3	13.257	1.210	16.041
STR. STRRP PER.	AF17	1.432 / 0.700 / 1.432	O.L=0.10 as	14	4.464	0.00	4.464	3	13.392	1.210	16.204
STR. STRRP PER.	AF18	1.454 / 0.700 / 1.454	O.L=0.10 as	14	4.509	0.00	4.509	3	13.527	1.210	16.368
STR. STRRP PER.	AF19	1.477 / 0.700 / 1.477	O.L=0.10 as	14	4.554	0.00	4.554	3	13.662	1.210	16.531
STR. STRRP TRANS.	AF20	0.320 / 0.700 / 0.320	O.L=0.10 25	12	2.240	0.00	2.240	15	33.600	0.888	29.837
STR. STRRP LONG.	AF21	1.387 / 0.340 / 1.387	O.L=0.10 as	12	3.654	0.00	3.654	3	10.962	0.888	9.734
STR. STRRP LONG.	AF22	1.409 / 0.340 / 1.409	O.L=0.10 as	12	3.699	0.00	3.699	3	11.097	0.888	9.854
STR. STRRP LONG.	AF23	1.432 / 0.340 / 1.432	O.L=0.10 as	12	3.744	0.00	3.744	3	11.232	0.888	9.974
STR. STRRP LONG.	AF24	1.454 / 0.340 / 1.454	O.L=0.10 as	12	3.789	0.00	3.789	3	11.367	0.888	10.094
STR. STRRP LONG.	AF25	1.477 / 0.340 / 1.477	O.L=0.10 as	12	3.834	0.00	3.834	3	11.502	0.888	10.214
CHAIR	PF14	0.400 / 0.857 / 0.400	as	14	2.914	0.00	2.914	40	116.560	1.210	141.038
									SUB TOTAL =	285.887	

Main Reinforcement		Chairs & Spacers	
BAR SIZE	WEIGHT (kg)	BAR SIZE	WEIGHT (kg)
8		8	-
10	-	10	-
12	79.706	12	
14	81.021	14	141.038
16	188.026	16	
18	848.250	18	
20		20	
22		22	
25	7,011.197	25	
28		28	
30		30	
32	810.526	32	
36		36	
TOTAL =	9,018.726	TOTAL =	141.038

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 6 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment Column

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
ABUTMENT 1 SHORT COLUMN											
MAIN REIN. NEAR SD.	AS1	0.300 6.964	12	32	7.264	0.00	7.264	7	50.848	6.313	321.003
MAIN REIN. FAR SIDE	AS2	0.300 7.422	10	25	7.722	0.00	7.722	8	61.775	3.854	238.081
REIN. SIDE BARS	AS3	0.300 6.964	as	25	7.264	0.00	7.264	8	58.112	3.854	223.964
REIN. SIDE BARS	AS4	0.300 3.908	as	16	4.208	0.00	4.208	2	8.415	1.580	13.296
L STIRRUP S	AS5 to 44	0.96:1.411 0.720 0.96:1.411	O.L=0.12 15	14	4.050	0.00	4.050	40	161.995	1.210	196.014
IN'MEDIATE STRRP LONG.	AS45 to 84	0.96:1.411 0.360 0.96:1.411	O.L=0.12 15	12	3.330	0.00	3.330	40	133.195	0.888	118.277
IN'MEDIATE STRRP TRANS.	AS85	0.639 0.720 0.639	O.L=0.12 27	12	2.959	0.00	2.959	23	68.052	0.888	60.430
IN'MEDIATE STRRP TRANS.	AS86	0.470 0.720 0.470	O.L=0.12 37	12	2.621	0.00	2.621	17	44.549	0.888	39.560
ABUTMENT 1 MID COLUMN											
MAIN REIN. NEAR SD.	AM1	0.300 7.108	12	32	7.408	0.00	7.408	7	51.856	6.313	327.367
MAIN REIN. FAR SIDE	AM2	0.300 7.568	10	25	7.868	0.00	7.868	8	62.942	3.854	242.577
REIN. SIDE BARS	AM3	0.300 7.108	as	25	7.408	0.00	7.408	8	59.264	3.854	228.403
REIN. SIDE BARS	AM4	0.300 3.986	as	16	4.286	0.00	4.286	2	8.572	1.580	13.544
L STIRRUP S	AM5 to 45	0.96:1.413 0.720 0.96:1.413	O.L=0.12 15	14	4.052	0.00	4.052	41	166.119	1.210	201.004
IN'MEDIATE STRRP LONG.	AM46 to 86	0.96:1.413 0.360 0.96:1.413	O.L=0.12 15	12	3.332	0.00	3.332	41	136.599	0.888	121.300
IN'MEDIATE STRRP TRANS.	AM87	0.639 0.720 0.639	O.L=0.12 27	12	2.959	0.00	2.959	24	71.008	0.888	63.055
IN'MEDIATE STRRP TRANS.	AM88	0.471 0.720 0.471	O.L=0.12 37	12	2.622	0.00	2.622	17	44.570	0.888	39.578
									SUB TOTAL =	**2,447.454**	

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 7 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1
Abutment Column

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
ABUTMENT 1 HIGH COLUMN											
MAIN REIN. NEAR SD.	AH1	0.300 7.252	12	32	7.552	0.00	7.552	7	52.864	6.313	333.730
MAIN REIN. FAR SIDE	AH2	0.300 7.559	10	25	7.859	0.00	7.859	8	62.870	3.854	242.303
REIN. SIDE BARS	AH3	0.300 7.252	as	25	7.552	0.00	7.552	8	60.416	3.854	232.843
REIN. SIDE BARS	AH4	0.300 4.065	as O.L=0.12	16	4.365	0.00	4.365	2	8.729	1.580	13.793
L STIRRUP S	AH5 to 46	0.96:1.414 0.720 0.96:1.414	15	14	4.053	0.00	4.053	42	170.244	1.210	205.995
IN'MEDIATE STRRP LONG.	AH47 to 88	0.96:1.414 0.360 0.96:1.414	O.L=0.12 15	12	3.333	0.00	3.333	42	140.004	0.888	124.324
IN'MEDIATE STRRP TRANS.	AH89	0.639 0.720 0.639	O.L=0.12 27	12	2.959	0.00	2.959	24	71.006	0.888	63.054
IN'MEDIATE STRRP TRANS.	AH86	0.471 0.720 0.471	O.L=0.12 37	12	2.623	0.00	2.623	18	47.214	0.888	41.926
ABUTMENT 2 SHORT COLUMN											
MAIN REIN. NEAR SD.	AS1	0.300 4.806	12	32	5.106	0.00	5.106	7	35.742	6.313	225.639
MAIN REIN. FAR SIDE	AS2	0.300 5.224	10	25	5.524	0.00	5.524	8	44.193	3.854	170.321
REIN. SIDE BARS	AS3	0.300 4.806	as	25	5.106	0.00	5.106	8	40.848	3.854	157.428
REIN. SIDE BARS	AS4	0.300 2.731	as	16	3.031	0.00	3.031	2	6.061	1.580	9.577
L STIRRUP S	AS5 to 30	0.96:1.37 0.720 0.96:1.37	O.L=0.12 15	14	4.010	0.00	4.010	26	104.264	1.210	126.160
IN'MEDIATE STRRP LONG.	AS31 to 56	0.96:1.37 0.360 0.96:1.37	O.L=0.12 15	12	3.290	0.00	3.290	26	85.544	0.888	75.963
IN'MEDIATE STRRP TRANS.	AM57	0.640 0.720 0.640	O.L=0.12 27	12	2.961	0.00	2.961	15	44.408	0.888	39.434
IN'MEDIATE STRRP TRANS.	AM58	0.457 0.720 0.457	O.L=0.12 37	12	2.593	0.00	2.593	11	28.525	0.888	25.330
									SUB TOTAL =	**2,087.820**	

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 8 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment Column

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
	ABUTMENT 2 MID COLUMN										
MAIN REIN. NEAR SD.	AM1	0.300 4.950	12	32	5.250	0.00	5.250	7	36.750	6.313	232.003
MAIN REIN. FAR SIDE	AM2	0.300 5.372	10	25	5.672	0.00	5.672	8	45.375	3.854	174.874
REIN. SIDE BARS	AM3	0.300 4.950	as	25	5.250	0.00	5.250	8	42.000	3.854	161.868
REIN. SIDE BARS	AM4	0.300 2.809	as	16	3.109	0.00	3.109	2	6.218	1.580	9.825
L STIRRUP S	AM5 to 31	0.96:1.374 0.720 0.96:1.374	O.L=0.12 15	14	4.014	0.00	4.014	27	108.374	1.210	131.132
IN'MEDIATE STRRP LONG.	AM32 to 58	0.96:1.374 0.360 0.96:1.374	O.L=0.12 15	12	3.294	0.00	3.294	27	88.934	0.888	78.973
IN'MEDIATE STRRP TRANS.	AM59	0.640 0.720 0.640	O.L=0.12 27	12	2.960	0.00	2.960	15	44.405	0.888	39.432
IN'MEDIATE STRRP TRANS.	AM60	0.458 0.720 0.458	O.L=0.12 37	12	2.596	0.00	2.596	11	28.553	0.888	25.355
	ABUTMENT 2 HIGH COLUMN										
MAIN REIN. NEAR SD.	AH1	0.300 5.094	12	32	5.394	0.00	5.394	7	37.758	6.313	238.366
MAIN REIN. FAR SIDE	AH2	0.300 5.519	10	25	5.819	0.00	5.819	8	46.555	3.854	179.422
REIN. SIDE BARS	AH3	0.300 5.094	as	25	5.394	0.00	5.394	8	43.152	3.854	166.308
REIN. SIDE BARS	AH4	0.300 2.888	as	16	3.188	0.00	3.188	2	6.375	1.580	10.073
L STIRRUP S	AH5 to 32	0.96:1.377 0.720 0.96:1.377	O.L=0.12 15	14	4.017	0.00	4.017	28	112.485	1.210	136.107
IN'MEDIATE STRRP LONG.	AH33 to 60	0.96:1.377 0.360 0.96:1.377	O.L=0.12 15	12	3.297	0.00	3.297	28	92.325	0.888	81.985
IN'MEDIATE STRRP TRANS.	AH61	0.640 0.720 0.640	O.L=0.12 27	12	2.960	0.00	2.960	16	47.363	0.888	42.059
IN'MEDIATE STRRP TRANS.	AH62	0.459 0.720 0.459	O.L=0.12 37	12	2.598	0.00	2.598	12	31.177	0.888	27.686
									SUB TOTAL =	**1,735.467**	

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD
Item : 50201 REINFORCED STEEL Grade 60
Bridge No. 1
Abutment Column

Page: 9 of 13
Drwg. No. _____

TOTAL WEIGHT OF STEEL PER BAR DIAMETER

-

S U M M A R Y

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	1,107.720
14	996.413
16	70.107
18	
20	
22	
25	2,418.391
28	
30	
32	1,678.109
36	
TOTAL =	**6,270.740**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	
16	
18	
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**0.000**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Bridge No. 1

Abutment Cap

Drwg. No. _____

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
MAIN REIN. BOTTOM	ACAP-001	1.088 7.050	15	25	8.138	0.00	8.138	32	260.416	3.854	1003.643
MAIN REIN. BOTTOM	ACAP-002	9.857	30	25	9.857	0.00	9.857	8	78.857	3.854	303.915
MAIN REIN. TOP	ACAP-003	1.088 10.410	15	32	11.498	0.00	11.498	16	183.968	6.313	1161.390
MAIN REIN. TOP	ACAP-004	1.088 4.110	15	32	5.198	0.00	5.198	16	83.168	6.313	525.040
MAIN REIN. TOP	ACAP-005	12.000	25	32	12.000	0.00	12.000	8	96.000	6.313	606.048
SIDE BARS	ACAP-006	12.000	28	18	12.000	0.00	12.000	20	240.000	2.000	480.000
SIDE BAR CLOSER RIGHT	ACAP-007	X = 1.500 1.045	28	18	4.045	0.00	4.045	10	40.450	2.000	80.900
SIDE BAR CLOSER LEFT	ACAP-008	X = 1.500 1.045	28	18	2.545	0.00	2.545	10	25.450	2.000	50.900
EXTERNAL STIRRUPS	ACAP-009	1.070 1.120 1.070	O.L=0.12 15	16	4.620	0.00	4.620	170	785.400	1.580	1240.932
INTERMEDIATE STIRRUPS	ACAP-010	0.713 1.120 0.713	O.L=0.12 15	14	3.907	0.00	3.907	170	664.133	1.210	803.601
INTERNAL STIRRUPS	ACAP-011	0.357 1.120 0.357	O.L=0.12 15	14	3.193	0.00	3.193	170	542.867	1.210	656.869
PLINTH VERTICAL	ACAP-012	X = 0.500 0.520	12	12	1.520	0.00	1.520	70	106.400	0.888	94.483
PLINTH VERTICAL	ACAP-013	X = 0.500 0.420	15	12	1.420	0.00	1.420	84	119.280	0.888	105.921
									SUB TOTAL =		7,113.642

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 11 of 13

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge No. 1

Abutment Cap

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
PLINTH HORIZON TAL	ACAP-014	X = 0.370 0.520	18	12	1.260	0.00	1.260	112	141.120	0.888	125.315
BACK WALL VERTICAL	ACAP-015	2.590 0.170 2.590	15	14	5.350	0.00	5.350	170	909.500	1.210	1100.495
BACK WALL HOR'TAL	ACAP-016	0.170 11.772	28	12	11.942	0.00	11.942	24	286.608	0.888	254.508
BACK WALL HOR'TAL	ACAP-017	0.170 1.628	28	12	1.798	0.00	1.798	24	43.152	0.888	38.319
B. WALL APP. SLB DOWELS	ACAP-018	0.400 0.400 0.200	32	25	0.400	0.00	0.400	82	32.800	3.854	126.411
BACK WALL BRACKET	ACAP-019	0.30 0.420 0.193 0.574 0.30	14	14	1.787	0.00	1.787	170	303.790	1.210	367.586
W.W. RIGHT BOTTOM	ACAP-020	0.738 3.281 1.667	as	18	5.686	0.00	5.686	8	45.488	2.000	90.976
W.W. RIGHT TOP	ACAP-021	1.950 3.420	as	25	5.370	0.00	5.370	8	42.960	3.854	165.568
W.W. RIGHT TOP	ACAP-022	2.310 2.500	as	25	4.810	0.00	4.810	4	19.240	3.854	74.151
W.W. RT HOR. FAR FACE	ACAP-023	0.300 3.420	15	20	3.720	0.00	3.720	10	37.200	2.470	91.884
W.W. RT HOR. FAR FACE	ACAP-024 to 27	0.300 3.360:2.737	15	20	3.349	0.00	3.349	8	26.788	2.470	66.167
W.W. RT HOR. FAR FACE	ACAP-028 to 36	0.300 3.511:1.720	15	20	2.896	0.00	2.896	18	52.120	2.470	128.737
W.W. RT HOR. NE-AR FACE	ACAP-037	0.300 3.420	15	16	3.720	0.00	3.720	10	37.200	1.580	58.776
									SUB TOTAL =	**2,688.893**	

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Bridge No. 1

Abutment Cap

Drwg. No. _____

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
W.W. RT HOR. NE-AR FACE	ACAP-038 to 41	0.300 3.360:2.737	15	16	3.349	0.00	3.349	8	26.788	1.580	42.325
W.W. RT HOR. NE-AR FACE	ACAP-042 to 50	0.300 3.511:1.720	15	16	2.896	0.00	2.896	18	52.120	1.580	82.350
W.W. RT VER. N & FAR FACE	ACAP-051 to 68	X = 0.300 0.76:2.67	15	14	2.315	0.00	2.315	72	166.680	1.210	201.683
W.W. RT VER. N & FAR FACE	ACAP-69	X = 0.300 2.670	15	14	3.270	0.00	3.270	20	65.400	1.210	79.134
SIDE WALL VERT.	ACAP-070	2.245 0.170 2.245	15	12	4.660	0.00	4.660	28	130.480	0.888	115.866
SIDE WALL HOR.	ACAP-071	1.900 0.170 1.900	14	12	3.970	0.00	3.970	32	127.040	0.888	112.812
W.W. LEFT BOTTOM	ACAP-072	0.738 3.281 1.667	as	18	5.686	0.00	5.686	8	45.488	2.000	90.976
W.W. LEFT TOP	ACAP-073	1.950 3.420	as	25	5.370	0.00	5.370	8	42.960	3.854	165.568
W.W. LEFT TOP	ACAP-074	2.310 2.500	as	25	4.810	0.00	4.810	4	19.240	3.854	74.151
W.W. LT HOR. FAR FACE	ACAP-075	0.300 3.420	15	20	3.720	0.00	3.720	10	37.200	2.470	91.884
W.W. LT HOR. FAR FACE	ACAP-076 to 79	0.300 3.360:2.737	15	20	3.349	0.00	3.349	8	26.788	2.470	66.167
W.W. LT HOR. FAR FACE	ACAP-080 to 88	0.300 3.511:1.720	15	20	2.916	0.00	2.916	18	52.480	2.470	129.627
W.W. LT HOR. NE-AR FACE	ACAP-089	0.300 3.420	15	16	3.720	0.00	3.720	10	37.200	1.580	58.776
										SUB TOTAL =	**1,311.318**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Bridge No. 1

Abutment Cap

Page: 13 of 13

Drwg. No. _____

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
W.W. LT HOR. NE-AR FACE	ACAP-090 to 93	0.300 3.360:2.737	15	16	3.349	0.00	3.349	8	26.788	1.580	42.325
W.W. LT HOR. NE-AR FACE	ACAP-094 to 102	0.300 3.511:1.720	15	16	2.916	0.00	2.916	18	52.480	1.580	82.919
W.W. LT VER. N & FAR FACE	ACAP-103 to 120	X = 0.300 0.76:2.67	15	14	2.315	0.00	2.315	72	166.680	1.210	201.683
W.W. LT VER. N & FAR FACE	ACAP-121	X = 0.300 2.670	15	14	3.270	0.00	3.270	20	65.400	1.210	79.134
Spacer Top	ACAP-122	1.000	130	32	1.000	0.00	1.000	20	20.000	6.313	126.260
Spacer Bottom	ACAP-123	1.000	130	25	1.000	0.00	1.000	20	20.000	3.854	77.080
										SUB TOTAL =	609.401

S U M M A R Y

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	847.223
14	3,490.185
16	1,608.404
18	793.752
20	574.466
22	
25	1,913.407
28	
30	
32	2,292.478
36	
TOTAL =	**11,519.914**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	
16	
18	
20	
22	
25	77.080
28	
30	
32	126.260
36	
TOTAL =	**203.340**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 1 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

PRE-CAST GIRDER

Girder Dimensions:

W =	1.780 m.	H1 =	0.060 m.	No. of Girder per span	= 7
W1 =	0.590 m.	H2 =	0.129 m.	No. of edge Girder per span	= 2
W2 =	0.600 m.	H3 =	0.120 m.	No. of mid Girder per span	= 5
W3 =	0.500 m.	H4 =	1.080 m.	No. of span	= 3
S.E. =	-1.500 %	L1 =	19.900 m.	Top Slab Thickness	= 0.18
		L2 =	19.300 m.		

SIDE ELEVATION

SECTION A - A

P L A N

LONGITUDINAL SECTION

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 2 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

PRE-CAST GIRDER

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BOTTOM 1ST LAYER A	G1	1.000 / 8.200	15	32	9.200	0.00	9.200	84	772.804	6.313	4878.712
BOTTOM 1ST LAYER A	G2	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 1ST LAYER A	G3	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 1ST LAYER B	G4	1.000 / 8.200	15	32	9.200	0.00	9.200	84	772.804	6.313	4878.712
BOTTOM 1ST LAYER B	G5	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 1ST LAYER B	G6	3.580	15	32	3.580	0.00	3.580	84	300.708	6.313	1898.369
BOTTOM 2ND LAYER C	G7	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 2ND LAYER C	G8	5.200	15	32	5.200	0.00	5.200	168	873.610	6.313	5515.100
BOTTOM 2ND LAYER D	G9	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 2ND LAYER D	G10	5.200	15	32	5.200	0.00	5.200	84	436.805	6.313	2757.550
BOTTOM 3RD LAYER E	G11	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
BOTTOM 3RD LAYER E	G12	5.200	15	32	5.200	0.00	5.200	84	436.805	6.313	2757.550
BOTTOM 3RD LAYER F	G13	12	15	32	12.000	0.00	12.000	84	1008.000	6.313	6363.504
SIDE BARS	G14	12	12	18	12.000	0.00	12.000	210	2520.000	2.000	5040.000
SIDE BARS	G15	8.550	12	18	8.550	0.00	8.550	210	1795.500	2.000	3591.000
									SUB TOTAL =		75,861.522

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 4

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

PRE-CAST GIRDER

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SIDE BARS CLOSER	G16	1.200 0.429 1.200	as	18	2.829	0.00	2.829	42	118.813	2.000	237.627
SIDE BARS CLOSER	G17	1.200 0.443 1.200	as	18	2.843	0.00	2.843	42	119.397	2.000	238.793
SIDE BARS CLOSER	G18	1.200 0.457 1.200	as	18	2.857	0.00	2.857	42	119.980	2.000	239.960
SIDE BARS CLOSER	G19	1.200 0.471 1.200	as	18	2.871	0.00	2.871	84	241.127	2.000	482.253
SIDE BARS CLOSER	G20	1.200 0.484 1.200	as	18	2.884	0.00	2.884	84	242.293	2.000	484.587
TOP REINFOR CEMENT	G21	1.000 10.800	18	32	11.800	0.00	11.800	210	2478.000	6.313	15643.614
EXTERNA L STIRRUPS	G22	0.526 1.105 1.097 0.425	O.L=0.12 12.5	16	3.393	0.00	3.393	1680	5700.240	1.580	9006.379
INTERNAL STIRRUPS	G23	1.270 0.240 1.097 1.270	O.L=0.12 12.5	16	3.260	0.00	3.260	1680	5476.800	1.580	8653.344
MID-SPAN STIRRUPS	G24	0.526 1.105 1.097 0.425	O.L=0.12 15	14	3.393	0.00	3.393	1344	4560.192	1.210	5517.832
MID-SPAN STIRRUPS	G25	1.270 0.240 1.270	O.L=0.12 15	16	3.260	0.00	3.260	1344	4381.440	1.580	6922.675
TOP FLANGE DOWELS	G26	0.350 0.180 0.85	15	12	1.380	0.00	1.380	2646	3651.480	0.888	3242.514
TOP FLANGE DOWELS	G27	0.350 0.180 0.85	15	12	1.380	0.00	1.380	2646	3651.480	0.888	3242.514
T. F. D. IN'R EDGE GIRDER	G28	0.350 0.180 0.85	as	12	1.380	0.00	1.380	12	16.560	0.888	14.705
T. F. D. OUT'R E. GIRDER	G29	0.350 0.180 0.85	as	12	1.380	0.00	1.380	12	16.560	0.888	14.705
TOP FLANGE TRANSVE RSE	G30	1.700	15	12	1.700	0.00	1.700	2667	4533.900	0.888	4026.103
									SUB TOTAL =		57,967.607

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD

Item : 50201 REINFORCED STEEL Grade 60

Bridge No. 1

PRE-CAST GIRDER

Page: 4 of 4

Drwg. No. _____

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
T. F. TR. OUT'R E. GIRDER	G30 '	0.500 1.100	as	12	1.600	0.00	1.600	48	76.800	0.888	68.198
TOP FLANGE	G31	12.000	15	10	12.000	0.00	12.000	420	5040.000	0.617	3109.680
TOP FLANGE	G32	8.050	15	10	8.050	0.00	8.050	420	3381.000	0.617	2086.077
LIFTING LUG	G33	0.55 0.90 0.32	as	25	1.770	0.00	1.770	168	297.360	3.854	1146.025
DIAPH DOWEL EXT. G'DER	G34	1.160 0.500 0.44	as	20	2.100	0.00	2.100	48	100.800	2.470	248.976
DIAPH DOWEL INT. G'DER	G35	1.160 0.44	as	20	2.760	0.00	2.760	120	331.200	2.470	818.064
Spacer	G36	0.400	as	20	0.400	0.00	0.400	630	252.000	2.470	622.440
									SUB TOTAL =		**8,099.461**

S U M M A R Y

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	5,195.757
12	10,608.741
14	5,517.832
16	24,582.398
18	10,314.220
20	1,067.040
22	
25	1,146.025
28	
30	
32	82,874.136
36	
TOTAL =	**141,306.149**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	
16	
18	
20	622.440
22	
25	
28	
30	
32	
36	
TOTAL =	**622.440**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 3

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge 1

S L A B

Slab Dimension:

L = 19.90 m.
W = 12.70 m.
T = 0.18 m.

No. of Slabs = 3

Diaphragm Dimension:

L = 1.32 m.
W = 0.30 m.
H = 1.00 m.

P L A N

TOP DIAPHRAGM DETAILS
SCALE: 1:50

SECTION FOR TOP SLAB REINFOFCEMENT
SCALE: 1:50

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 2 of 3

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

S L A B

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
LONGITUDINAL BOTTOM	SL1	0.100 11.900	15	14	12.000	0.00	12.000	192	2304.000	1.210	2787.840
LONGITUDINAL BOTTOM	SL2	0.100 8.760	15	14	8.860	0.00	8.860	192	1701.120	1.210	2058.355
TRANSVERSE BOTTOM	SL3	0.100 5.528	12.5	16	5.628	0.00	5.628	480	2701.440	1.580	758.400
TRANSVERSE BOTTOM	SL4	0.100 8.052	12.5	16	8.152	0.00	8.152	480	3912.960	1.580	6182.477
TRANSVERSE TOP	SL5	5.528	12.5	16	5.528	0.00	5.528	480	2653.440	1.580	4192.435
TRANSVERSE TOP	SL6	8.052	12.5	16	8.052	0.00	8.052	480	3864.960	1.580	6106.637
LONGITUDINAL TOP	SL7	0.100 4.990	15	18	5.090	0.00	5.090	510	2595.900	2.000	5191.800
LONGITUDINAL TOP	SL8	12.000	15	14	12.000	0.00	12.000	255	3060.000	1.210	3702.600
NEW JERSEY DOWELS	SL9	0.750 0.900 0.30 0.38	15	16	2.330	0.00	2.330	798	1859.340	1.580	2937.757
Chairs	SL10	0.200 0.060 0.200	as	12	0.720	0.00	0.720	150	108.000	0.888	95.904
									SUB TOTAL =		34,014.205

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 3 of 3

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

DIAPHRAGM

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
DIAPHRAGM STIRRUP	DP1	0.240 0.940 0.240	O.L=0.10 15	14	2.560	0.00	2.560	360	921.600	1.210	1115.136
DIAPHRAGM LONGITUDINAL TOP	DP2	0.100 8.334	as	25	8.434	0.00	8.434	24	202.416	3.854	780.111
DIAPHRAGM LONGITUDINAL TOP	DP3	0.100 5.806	as	25	5.906	0.00	5.906	24	141.744	3.854	92.496
DIAPHRAGM SIDE BARS	DP4	1.240	15	14	1.240	0.00	1.240	288	357.120	1.210	432.115
										SUB TOTAL =	2,419.858

SUMMARY

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	10,096.046
16	20,177.706
18	5,191.800
20	
22	
25	872.607
28	
30	
32	
36	
TOTAL =	**36,338.160**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	95.904
14	
16	
18	
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**95.904**

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **TAIF AL BAHA - ABHA ROAD** Page: 1 of 2

Item : **50201 REINFORCED STEEL Grade 60** Drwg. No. _____

Bridge 1

S L A B

Slab Dimension:

L = 11.82 m.

W = 4.00 m.

T = 0.30 m.

No. of Slabs = 2

TOP VIEW

APP. SLAB REINFORCEMENT

SECTION C-C
SCALE 1:25

Suprv'g. Consultant : ***ITAL CONSULT***	***TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : TAIF AL BAHA - ABHA ROAD — Page: 2 of 2

Item : 50201 REINFORCED STEEL Grade 60 — Drwg. No. _____

Bridge No. 1

APPROACH SLAB

Location	Bar Mark	Shape & Dimen'n	Spacing (cm)	Size (mm)	Length (m)	Bend Ded'n (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BOTTOM TRANSVERSE	APSL 1	X = 0.240 3.940	15	20	4.420	0.00	4.420	158	698.360	2.470	1724.949
BOTTOM LONGITUDINAL	APSL 2	X = 0.150 11.700	15	16	12.000	0.00	12.000	54	648.000	1.580	1023.840
TOP LONGITUDINAL	APSL 3	X = 0.150 11.700	15	16	12.000	0.00	12.000	54	648.000	1.580	85.320
TOP TRANSVERSE	APSL 4	X = 0.240 3.940	15	20	4.420	0.00	4.420	158	698.360	2.470	1724.949
Chairs	APSL 5	0.400 0.168 0.400	as	12	1.536	0.00	1.536	20	30.720	0.888	27.279
										SUB TOTAL =	**4,586.338**

SUMMARY

MAIN REINFORCEMENT

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	
14	
16	1,109.160
18	
20	3,449.898
22	
25	
28	
30	
32	
36	
TOTAL =	**4,559.058**

CHAIRS & SPACERS

BAR SIZE (mm)	WEIGHT (kg)
8	
10	
12	27.279
14	
16	
18	
20	
22	
25	
28	
30	
32	
36	
TOTAL =	**27.279**

Suprv'g. Consultant : *ITAL CONSULT*	*TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Civil Engineer — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF AL BAHA - ABHA ROAD — Page: 1 of 1

Item : 5030205 SUB-STRUCTURE CONCRETE(Class20/280) — Drwg. No.

BRIDGE 1

S.R. NO.	DESCRIPTION	Unit	VOLUME (m³)	REMARKS
1	PIER FOUNDATION	M³	165.000	
2	PIER COLUMN	M³	34.800	
3	PIER CAP	M³	54.115	
4	ABUTMENT FOUNDATION	M³	165.100	
5	ABUTMENT COLUMN	M³	30.088	
6	ABUTMENT CAP	M³	17.219	
7	APPROACH SLAB	M³	28.368	
TOTAL =			**494.691**	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF AL BAHA - ABHA ROAD (Section 3)	Contractor : M. A. AL SWAILEM CO.
Civil Engineer — Res. Engineer		Qty. Surveyor — Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor :
ITAL CONSULT		***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __3__

Item : ***5030205*** **CONCRETE IN PIER FOUNDATION** Drwg. No. _____

Pier Foundation

Length =	11.000	m.
Width =	5.000	m.
Height =	1.500	m.
Pier Dia. =	1.200	m.
NO.OF PIERS	2	

Pier Column

Top of P1 Column 1 Level	=	2149.370
Top of P1 Column 2 Level	=	2149.159
Top of P2 Column 1 Level	=	2148.916
Top of P2 Column 2 Level	=	2148.705
Top of P1 Foundation Level	=	2141.670
Top of P2 Foundation Level	=	2141.020
Superelevation	=	-3.20%

Pier Cap

W1	=	0.250	m.
W2	=	1.295	m.
W3	=	1.516	m.
H1	=	0.700	m.
H2	=	0.500	m.
L1	=	12.680	m.
L2	=	0.500	m.

PIER FOUNDATION (L x W x H)		
LENGTH	11.000	m
WIDTH	5.000	m
HEIGHT	1.500	m
QTY. (m^3)	82.500	m
Pier Foundation Qty.	**165.000**	**m^2**

PIER FOUNDATION SIDE ELEVATION

PIER FOUNDATION PLAN

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT	***DOUBLING TAIF-BAHA-ABHA ROAD***	***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _2__ of __3__

Item : ***5030205*** **CONCRETE IN PIER COLUMN** Drwg. No. _____

Superelevation (S.E.) = ***-3.20%***

PIER	COL.	EL 1	EL 2	H1	H2	Have	H3	H4	Have
P1	C1	2149.370		7.719	7.681	7.700			
	C2		2149.159				7.508	7.470	7.489
P2	C1	2148.916		7.915	7.877	7.896			
	C2		2148.705				7.704	7.666	7.685

TOP OF PIER FOUND-ATION LEVEL

P1 = 2141.670

P2 = 2141.020

No. Column	Diamter	Area	Have.	Volume
	m	m²	m	m³
P1C1	1.20	1.131	7.700	8.709
P1C2	1.20	1.131	7.489	8.470
P2C1	1.20	1.131	7.896	8.930
P2C2	1.20	1.131	7.685	8.692
			COLUMN TOTAL	**34.800**

COLUMN SECTION

PIER COLUMN ELEVATION

Suprv'g. Consultant :		Contractor :
ITAL CONSULT	***DOUBLING TAIF-BAHA-ABHA ROAD***	***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _3__ of __3__

Item : ***5030205*** **CONCRETE IN PIER CAP** Drwg. No. _____

Given :

Wa	=	1.906	m.	L1	=	12.680	m.	H1	=	0.700	m.
W1	=	0.250	m.	L2	=	0.500	m.	H2	=	0.500	m.
W2	=	1.295	m.	L3	=	11.680	m.				
W3	=	1.516	m.								

NO.OF PIER CAP 2

PIER CAP SIDE ELEVATION

PIER CAP ELEVATION

AREA 1 (A1)

= Wa x L1

= 24.162 m².

AREA 2 (A2)

= (w2 + w3)/2 x L3

= 16.416 m².

VOLUME 1 (V1)

= A1 x h1

= 16.913 m³.

VOLUME 2 (V2)

= (A1+A2)/2 x h2

= 10.144 m³.

Total Volume = = 54.115 m³.

PIER CAP PLAN

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT		***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

DOUBLING TAIF-BAHA-ABHA ROAD

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: _1__ of __3__

Item : *5030205* CONCRETE IN ABUTMENT FOUNDATION — Drwg. No. _____

ABUTMENT FOUNDATION

LOC'N	Length	Width	Thickness
ABT-1	13.000	6.000	1.200
ABT-2	13.000	5.000	1.100

NO.OF ABUT.	2	3	Col / Abut
Superelevation =	-3.20%		

ABUTMENT COLUMN

Top of A1 Column 1 Level	=	2149.574
Top of A1 Column 2 Level	=	2149.718
Top of A1 Column 3 Level	=	2149.862
Top of A2 Column 1 Level	=	2148.502
Top of A2 Coulumn 2 Level	=	2148.358
Top of A2 Column 3 Level	=	2148.214
Top of A1 Foundation Level	=	2143.610
Top of A2 Foundation Level	=	2144.408

	L1	L2	W
ABT-1	1.05	1.60	0.80
ABT-2	1.05	1.20	0.80

ABUTMENT CAP

H1 =	1.55	m.
H2 =	1.20	m.
W1 =	0.90	m.
W2 =	0.90	m.
L =	4.67	m.

ABUT'T FOUND'N SIDE ELEVATION

ABUTMENT FOUNDATION SECTION

(L x W x H)	ABT-1	ABT-2
LENGTH	13.000	13.000
WIDTH	6.000	5.000
HEIGHT	1.200	1.100
QTY. (m^3)	93.600	71.500

TOTAL QTY.	**165.100**	**m^3**

ABUTMENT FOUNDATION PLAN

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT	*DOUBLING TAIF-BAHA-ABHA ROAD*	*M. A. AL SWAILEM CO.*	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _2__ of __3__

Item : ***5030205*** **CONCRETE IN ABUTMENT COLUMN** Drwg. No. _____

ABT.	COL.	H1	H2	Have	H3	H4	Have	H5	H6	Have
A1	C1	5.951	5.977	5.964						
	C2				6.095	6.121	6.108			
	C3							6.239	6.265	6.252
A2	C1	4.081	4.107	4.094						
	C2				3.937	3.963	3.950			
	C3							3.793	3.819	3.806

ABUT'T COLUMN SIDE ELEVATION

ABUTMENT COLUMN SECTION

ABUT. COLUMN (L1+L2)/2 x W x Have)	
A1C1	6.322
A1C2	6.474
A1C3	6.627
A2C1	3.685
A2C2	3.555
A2C3	3.425
QTY. (m^3)	**30.088**

TOTAL QTY.	**30.088**	**m^3**

ABUTMENT COLUMN PLAN

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT		***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

DOUBLING TAIF-BAHA-ABHA ROAD

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _3__ of __3__

Item : ***5030205*** **CONCRETE IN ABUTMENT CAP** Drwg. No. _____

Given:

H1 =	1.55	m.
H2 =	1.20	m.
W1 =	0.90	m.
W2 =	0.90	m.
L =	4.67	m.
Wa =	0.90	m.

No. of Abutment = **2**

AREA A =	(0.25*2+0.25)/2)* 0.25 =	0.094	m²
AREA B =	H1 x 0.25 =	0.388	m²
AREA C =	(0.25 + Wa) x h2 =	1.380	m²
VOLUME A =	area A x (L-0.44 x 2) =	0.355	m³
VOLUME B =	area B x L =	1.810	m³
VOLUME C =	area C x L =	6.445	m³
Total Vol. =	**Va + Vb + Vc =**	**8.610**	**m³**
Grand Total =		**17.219**	**m³**

SIDE ELEVATION

FRONT ELEVATION

P L A N

Suprv'g. Consultant :		Contractor :	
ITAL CONSULT		***M. A. AL SWAILEM CO.***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

DOUBLING TAIF-BAHA-ABHA ROAD

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : ***5030205*** **CONCRETE IN BRIDGE APPROACH SLAB** Drwg. No. _____

APPROACH SLAB DIMENSION :

L = 4.00 m.
W = 11.82 m.
T = 0.30 m.

No. of A. Slabs = 2

APPROACH SLAB PLAN

Volume for one approach slab = L x W x T

L m	W m	T m	Volume m³
4.00	11.820	0.30	14.184

Volume for all approach slabs = **28.368** m³

APPROACH SLAB SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF AL BAHA - ABHA ROAD** Page: 1 of 1

Item : **5030107** **SUPER-STRUCTURE CONCRETE (Class 20/350)** Drwg. No.

BRIDGE 1

S.R. NO.	DESCRIPTION	Unit	VOLUME (m^3)	REMARKS
1	PRE-CAST T-GIRDERS	M^3	323.950	
2	SLAB (CAST IN SITU)	M^3	136.474	
3	DIAPHRAGM BEAMS	M^3	17.107	
TOTAL =			**477.531**	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF AL BAHA - ABHA ROAD*** **(Section 3)**	Contractor : ***M. A. AL SWAILEM CO.***
Civil Engineer Res. Engineer		Qty. Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: _1__ of __2__

Item : *5030107* CONCRETE IN PRECAST GIRDER — Drwg. No. _____

Given :

W	=	1.780	m.	H1	=	0.060	m.	No. of Girder per span	=	7
W1	=	0.590	m.	H2	=	0.129	m.	No. of edge Girder per span	=	2
W2	=	0.600	m.	H3	=	0.120	m.	No. of mid Girder per span	=	5
W3	=	0.500	m.	H4	=	1.080	m.	No. of span	=	3
S.E.	=	-1.500	%	L1	=	19.900	m.			
				L2	=	19.300	m.			

A1 m²		A2 m²		A3 m²		A4 m²		AREA m²	VOLUME m³
(h1+h2)/2	x W1	(h2+h3)/2	x W2	(h3+h1)/2	x W1	(w2+w3)/2	x h4	A1+A2+A3+A4	((At x L1) x no. of girder) - Ded'n) x no. of span
0.056		0.075		0.053		0.594		**0.778**	**323.950**

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING TAIF-BAHA-ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF QUANTITIES

Project : DOUBLING TAIF-BAHA-ABHA ROAD — Page: _2__ of __2__

Item : *5030107* CONCRETE IN PRECAST GIRDER — Drwg. No. _____

Volume Deduction:

Mid Girder deduction	=	(A1+A3) x 0.30 x 2 x no. of mid girder	=	0.327	m³
Edge Girder deduction	=	(A1+A3) x 0.30 x no. of edge girder	=	0.065	m³
		Volume Deduction per Span =		**0.392**	m³

PLAN FOR MID GIRDER **PLAN FOR EDGE GIRDER**

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING TAIF-BAHA-ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : ***5030107*** **CONCRETE IN BRIDGE SLAB** Drwg. No. _____

SLAB DIMENSION :

L = 19.90 m.
W = 12.70 m.
T = 0.18 m.

No. of Slabs = 3

SLAB PLAN

Volume for one slab = L x W x T

L m	W m	T m	Volume m³
19.90	12.700	0.18	45.491

Volume for all slabs = **136.474** m³

SLAB SECTION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF QUANTITIES

Project : **DOUBLING TAIF-BAHA-ABHA ROAD** Page: _1__ of __1__

Item : ***5030107*** **CONCRETE IN BRIDGE DIAPHRAGM** Drwg. No. _____

DIAPHRAGM DIMENSION :

L = 1.32 m.
W = 0.30 m.
H = 1.200 m.

No. of Diaphragms = 36

DIAPHRAGM SECTION

Volume for one diaphragm = L x W x H

L m	W m	H m	Volume m³
1.320	0.300	1.20	0.475

Volume for all diaphragm = **17.107** m³

DIAPHRAGM ELEVATION

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF-BAHA-ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

CONSULTANT	KINGDOM OF SAUDI ARABIA	CONTRACTOR
ITALCONSULT	MINISTRY OF TRANSPORTATION General Technical Adminstration	M. A. AL SWAILEM CO. LTD.

FINAL QUANTITIES

الكميات النهائية

PROJECT: DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3 — Page 1 of 1

ITEM: (5030205) BRIDGE'S SUB - STRUCTURE REINFORCED CONCRETE GRADE (280/20) — Drwg. No.:

LOCATION: BRIDGE 10 @ STATION (50+465.569) — Date: 13/09/2022

SUMMARY OF BRIDGE 10 @ STATION (50+465.569)

PAGE #	LOCATION	UNIT	QUANTITY SUB-TOTAL
1	PIER # 1 - FOUNDATION	m^3	88.980
2	PIER # 2 - FOUNDATION	m^3	88.980
3	PIER # 3 - FOUNDATION	m^3	82.500
4	PIER # 4 - FOUNDATION	m^3	82.500
5	PIER # 1 - COLUMNS	m^3	
6	PIER # 2 - COLUMNS	m^3	
7	PIER # 3 - COLUMNS	m^3	
8	PIER # 4 - COLUMNS	m^3	
9	PIER # 1 - CAP	m^3	
10	PIER # 2 - CAP	m^3	
11	PIER # 3 - CAP	m^3	
12	PIER # 4 - CAP	m^3	
13	APUTMENT # 1 - FOUNDATION	m^3	
14	APUTMENT # 2 - FOUNDATION	m^3	
15	APUTMENT # 1 - COLUMNS	m^3	
16	APUTMENT # 2 - COLUMNS	m^3	
17	APUTMENT # 1 - CAP	m^3	
18	APUTMENT # 2 - CAP	m^3	

QUANTITY GRAND TOTAL	342.960	m^3

CONSULTANT	PROJECT	CONTRACTOR
ITALCONSULT	DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3	M. ALI AL SWAILEM CO. LTD.
QUANTITY SURVEOR — RESIDENT ENGINEER		QUANTITY SURVEOR — PROJECT MANAGER

CONSULTANT	KINGDOM OF SAUDI ARABIA	CONTRACTOR
ITALCONSULT	MINISTRY OF TRANSPORTATION General Technical Adminstration	M. A. AL SWAILEM CO. LTD.

FINAL QUANTITIES

الكميات النهائية

PROJECT: DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3

ITEM: (5030205) BRIDGE'S SUB - STRUCTURE REINFORCED CONCRETE GRADE (280/20)

Drwg. No.:

LOCATION: BRIDGE 10 @ STATION (50+465.569)
PIER # 1 - FOUNDATION

Date: 13/09/2022

FOUNDATION	
LENGTH	11.000
WIDTH	5.000
HEIGHT	1.500
LEVEL	1584.288

PEDISTAL	
LENGTH	1.800
WIDTH	1.800
HEIGHT	1.000
No.	2

QTY. (m^3)	82.500

QTY. (m^3)	6.480

TOTAL QTY.	88.980	m^3

CONSULTANT	PROJECT	CONTRACTOR
ITALCONSULT	DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3	M. ALI AL SWAILEM CO. LTD.
QUANTITY SURVEOR / RESIDENT ENGINEER		QUANTITY SURVEOR / PROJECT MANAGER

CONSULTANT	KINGDOM OF SAUDI ARABIA	CONTRACTOR
ITALCONSULT	MINISTRY OF TRANSPORTATION General Technical Adminstration	M. A. AL SWAILEM CO. LTD.

FINAL QUANTITIES

الكميات النهائية

PROJECT: DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3 — Page 2 of 18

ITEM: (5030205) BRIDGE'S SUB - STRUCTURE REINFORCED CONCRETE GRADE (280/20) — Drwg. No.:

LOCATION: BRIDGE 10 @ STATION (50+465.569) PIER # 2 - FOUNDATION — Date: 13/09/2022

FOUNDATION	
LENGTH	11.000
WIDTH	5.000
HEIGHT	1.500
LEVEL	1584.288

PEDISTAL	
LENGTH	1.800
WIDTH	1.800
HEIGHT	1.000
No.	2

QTY. (m^3)	82.500

QTY. (m^3)	6.480

TOTAL QTY.	88.980	m^3

CONSULTANT	PROJECT	CONTRACTOR
ITALCONSULT	DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3	M. ALI AL SWAILEM CO. LTD.
QUANTITY SURVEOR — RESIDENT ENGINEER		QUANTITY SURVEOR — PROJECT MANAGER

CONSULTANT	KINGDOM OF SAUDI ARABIA	CONTRACTOR
ITALCONSULT	MINISTRY OF TRANSPORTATION General Technical Adminstration	M. A. AL SWAILEM CO. LTD.

FINAL QUANTITIES

الكميات النهائية

PROJECT: DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3

ITEM: (5030205) BRIDGE'S SUB - STRUCTURE REINFORCED CONCRETE GRADE (280/20)

Drwg. No.:

LOCATION: BRIDGE 10 @ STATION (50+465.569)
PIER # 3 - FOUNDATION

Date: 13/09/2022

FOUNDATION	
LENGTH	11.000
WIDTH	5.000
HEIGHT	1.500
LEVEL	1584.288

QTY. (m^3)	82.500

TOTAL QTY.	82.500	m^3

CONSULTANT	PROJECT	CONTRACTOR
ITALCONSULT	DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3	M. ALI AL SWAILEM CO. LTD.
QUANTITY SURVEOR / RESIDENT ENGINEER		QUANTITY SURVEOR / PROJECT MANAGER

CONSULTANT	KINGDOM OF SAUDI ARABIA	CONTRACTOR
ITALCONSULT	MINISTRY OF TRANSPORTATION General Technical Adminstration	M. A. AL SWAILEM CO. LTD.

FINAL QUANTITIES

الكميات النهائية

PROJECT: DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3 — Page 4 of 18

ITEM: (5030205) BRIDGE'S SUB - STRUCTURE REINFORCED CONCRETE GRADE (280/20) — Drwg. No.:

LOCATION: BRIDGE 10 @ STATION (50+465.569) PIER # 4 - FOUNDATION — Date: 13/09/2022

FOUNDATION	
LENGTH	11.000
WIDTH	5.000
HEIGHT	1.500
LEVEL	1584.288

QTY. (m^3)	82.500

TOTAL QTY.	82.500	m^3

CONSULTANT	PROJECT	CONTRACTOR
ITALCONSULT	DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3	M. ALI AL SWAILEM CO. LTD.
QUANTITY SURVEOR — RESIDENT ENGINEER		QUANTITY SURVEOR — PROJECT MANAGER

CONSULTANT	KINGDOM OF SAUDI ARABIA	CONTRACTOR
ITALCONSULT	MINISTRY OF TRANSPORTATION General Technical Adminstration	M. A. AL SWAILEM CO. LTD.

FINAL QUANTITIES

الكميات النهائية

PROJECT: DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3

ITEM: (5030205) BRIDGE'S SUB - STRUCTURE REINFORCED CONCRETE GRADE (280/20)

Drwg. No.:

LOCATION: BRIDGE 10 @ STATION (50+465.569)
PIER # 4 - FOUNDATION

Date: 13/09/2022

FOUNDATION	
LENGTH	11.000
WIDTH	5.000
HEIGHT	1.500
LEVEL	1584.288

QTY. (m^3)	82.500

TOTAL QTY.	82.500	m^3

CONSULTANT	PROJECT	CONTRACTOR
ITALCONSULT	DUALIZATION OF TAIF / AL BAHA / ABHA ROAD - SECTION 3	M. ALI AL SWAILEM CO. LTD.
QUANTITY SURVEOR / RESIDENT ENGINEER		QUANTITY SURVEOR / PROJECT MANAGER

R.C.P.C.

PCFORM samples

LEFT		RIGHT
2 : 1	SP = 0.06003 6.0030%	2 : 1
SL1 = 0.50000 Ø = 26.56499	Pø = 1	SL1 = 0.50000 Ø = 26.56499
	pt = 0.114	
a1 = 2.53199		b1= 1.98918

1.) D1/E1

D1=

E1

2.) D2/E2

D2=

E2=

3.) D3/E3

D3 = 7.800

E3 = 2091.269

4.) D4/E4

D4 = 7.541

E4 = 2091.139

5.) D5/E5 3.4353°

D5 = 6.404 6.0030%

E5 = 2090.571

6.) D6/E6 0.000 2089.687

D6 = 5.268

E6 = 2090.003 WL = 4.121

7.) D7/E7

D7 = 5.009 WR = 3.452

E7 = 2089.873

Length = 13.404

9.) D9/E9

D9 =

E9 =

10) D10/E10

D10 =

E10 =

11.) D11/E11

D11 = 18.688

E11 = 2091.923

12.) D12/E12

D12 = 18.891

E12 = 2091.821

13.) D13/E13

D13 = 19.784

E13 = 2091.374

14.) D14/E14

D14 = 20.677

E14 = 2090.928

15.) D15/E15

D15 = 20.881

E15 = 2090.826

R. C. P. C.

Skew = 90 deg.

Sta.
RCPC 1.00
t = 0.114
SSL = 2.0000 :1 SSR = 2.0000 :1
LOFFSET= -21.515 ROFFSET= 21.033
LLEV.= 2159.878 RLEV.= 2160.119

R. C. P. C.

Skew = 90 °
P.G.L. = 2163.000
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Sta. 0+074 crossing ro
RCPC 1.00
t = 0.114
SSL = 4.0000 :1 SSR = 4.0000 :1
C.L.elev.= 161.706
Pipe slope = 0.03150

R. C. P. C.

Skew = 90 ° Normal
P.G.L. = 164.627
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.500
Layer = 0.630

R. C. P. C.

Sta. **970+266.950**
RCPC **1.00**
t = 0.114
SSL = 2.0000 :1 SSR = 2.0000 :1
LOFFSET= -21.515 ROFFSET= 21.033
LLEV.= 2159.878 RLEV.= 2160.119

Skew = 60 ° Left
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

R. C. P. C.

Station	37+452.180		
RCPC	**1.00**		
t =	0.114	Skew =	40 ° Left
SSL =	3.1114 :1 SSR = 3.1114 :1	C.W. =	7.300
LOFFSET=	-31.517 ROFFSET= 41.218	H/MED. =	2.000
LLEV.=	2031.980 RLEV.= 2031.569	Layer =	0.630

SECTION A - A

		t =	0.630	xleft =	3.316	xright =	2.032		
		s.e.left =	0.06	yleft =	0.829	yright =	0.508		
		skew =	40 left		s.e.right =	0.06			
		slope =	0.25	6.223	SLB =	0.3889	2.5711		
		rd. width =	14.300		SLR =	3.1115	0.3214		
		half med=	2.000		Dg1 =	-27.664		24.006	
					Eg1 =	2029.478	SL2	2032.247	SL2
Station	37+452.180				Dg2 =	-73.496	0.006	36.333	0.17271
		PGL	S.E.		Eg2 =	2029.203		2034.376	
1	37+473.174	2034.869	0.06	a	17.616	b	20.994	c	27.405
2	37+469.222	2035.02	0.06	a	14.300	b	17.042	c	22.247
3	37+454.563	2035.583		a	2.000	b	2.383	c	3.111
4	37+452.180	2035.674		a		b		c	
5	37+449.797	2035.766		a	2.000	b	2.383	c	3.111
6	37+435.138	2036.327	0.06	a	14.300	b	17.042	c	22.247
7	37+432.716	2036.42	0.06	a	16.332	b	19.464	c	25.408

R. C. P. C.
LEFT & RIGHT FILL - SKEW LEFT

Station 37+452.180
RCPC 1.00
t = 0.114
SSL = 3.1114 :1 SSR = 3.1114 :1
C.L. ELEV.= #######
PIPE SLOPE = 0.04000

Skew = 40 ° Left
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

SECTION A - A

Length of Pipe = 71.147 m. for left vertical
Length of Pipe = 71.143 m. for right vertical

		t =	0.630	xleft =	3.316	xright =	2.032		
		s.e.left =	0.06	yleft =	0.829	yright =	0.508		
		skew =	40 left		s.e.right =	0.06			
		slope =	0.25	6.223	SLB =	0.3889	2.5711		
		rd. width =	14.300		SLR =	3.1115	0.3214		
		half med=	2.000		Dg1 =	-27.664		24.006	
					Eg1 =	2029.478	SL2	2032.247	SL2
Station	37+452.180				Dg2 =	-73.496	0.006	36.333	0.17271
		PGL	S.E.		Eg2 =	2029.203		2034.376	
1	37+473.174	2034.869	0.06	a	17.616	b	20.994	c	27.405
2	37+469.222	2035.02	0.06	a	14.300	b	17.042	c	22.247
3	37+454.563	2035.583		a	2.000	b	2.383	c	3.111
4	37+452.180	2035.674		a		b		c	
5	37+449.797	2035.766		a	2.000	b	2.383	c	3.111
6	37+435.138	2036.327	0.06	a	14.300	b	17.042	c	22.247
7	37+432.716	2036.42	0.06	a	16.332	b	19.464	c	25.408

R. C. P. C.
LEFT & RIGHT FILL - SKEW Right

Station 37+836.740
RCPC 1.00
t = 0.114
SSL = 2.3094 :1 SSR = 2.3094 :1
C.L. ELEV.= #######
PIPE SLOPE = -0.04000

Skew = 60 ° Right
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

		t =	0.63	xleft =	2.921	xright =	2.203		
		s.e.left =	0.036	yleft =	0.727	yright =	0.551		
		skew =	60 right		s.e.right =	0.036			
		slope =	0.25	4.619	SLB =	0.2887	3.4641		
		rd. width =	14.3		SLR =	2.3094	0.4330		
		half med=	2		Dg1 =	-24.59		24.268	
					Eg1 =	2019.202	SL2	2018.666	SL2
Station	37+836.740				Dg2 =	-38.917	-0.02457	63.263	-0.01459
					Eg2 =	2019.554		2018.097	
1	37+826.797	2026.675	0.033241	a	17.221	b	9.943	c	19.885
2	37+828.484	2026.674	0.034345	a	14.300	b	8.256	c	16.512
3	37+835.585	2026.676		a	2.000	b	1.155	c	2.309
4	37+836.740	2026.677		a		b		c	
5	37+837.895	2026.678		a	2.000	b	1.155	c	2.309
6	37+844.996	2026.689	0.036	a	14.300	b	8.256	c	16.512
7	37+846.268	2026.691	0.036	a	16.503	b	9.528	c	19.056

R. C. P. C.
LEFT FILL & RIGHT CUT - SKEW LEFT

Station 35+003.205

RCPC 1.00

t = 0.114

SSL = 2.9889 :1 SSR = 2.9889 :1

C.L. ELEV.= #######

PIPE SLOPE = 0.04000

Skew = 42 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

		t =	0.63	xleft =	2.086	xright =	2.865		
		s.e.left =	-0.052	yleft =	0.522	yright =	0.702		
		skew =	42 left		s.e.right =	-0.052			
		slope =	0.25	5.978	SLB =	0.3736	2.6765		
		rd. width =	14.3		SLR =	2.9890	0.3346		
		half med=	2		Dg1 =	-18.713		16.958	
					Eg1 =	2121.886	SL2	2123.703	SL2
Station	35+003.205				Dg2 =	-42.535	0.112585	50	0
					Eg2 =	2119.204		2123.703	
1	35+021.404	2122.563	-0.052	a	16.386	b	18.199	c	24.489
2	35+019.087	2122.679	-0.052	a	14.300	b	15.882	c	21.371
3	35+005.426	2123.414		a	2.000	b	2.221	c	2.989
4	35+003.205	2123.541		a		b		c	
5	35+000.984	2123.671		a	2.000	b	2.221	c	2.989
6	34+987.323	2124.515	-0.03014	a	14.300	b	15.882	c	21.371
7	34+984.141	2124.724	-0.02497	a	17.165	b	19.064	c	25.653

R. C. P. C.
LEFT FILL & RIGHT CUT - SKEW Right

Station 41+297.543
RCPC 1.00
t = 0.114
SSL = 2.0076 :1 SSR = 2.0076 :1
C.L. ELEV.= #######
PIPE SLOPE = 0.04000

Skew = 85 ° Right
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

SECTION A - A

Length of Pipe = 44.666 m. for left vertical
Length of Pipe = 44.664 m. for right vertical

		t =	0.63	xleft =	2.239	xright =	2.848		
		s.e.left =	-0.03011	yleft =	0.559	yright =	0.711		
		skew =	85	right	s.e.right =	-0.03011			
		slope =	0.25	4.015	SLB =	0.2510	3.9848		
		rd. width =	14.3		SLR =	2.0076	0.4981		
		half med=	2		Dg1 =	-20.03		9.457	
					Eg1 =	2018.414	SL2	2025.01	SL2
Station	41+297.543				Dg2 =	-23.568	0.002544	23.85	0.27034
					Eg2 =	2018.405		2028.901	
1	41+296.096	2020.632	-0.03161	a	16.539	b	1.447	c	16.602
2	41+296.292	2020.625	-0.0314	a	14.300	b	1.251	c	14.355
3	41+297.368	2020.589		a	2.000	b	0.175	c	2.008
4	41+297.543	2020.583		a		b		c	
5	41+297.718	2020.577		a	2.000	b	0.175	c	2.008
6	41+298.794	2020.54	-0.02881	a	14.300	b	1.251	c	14.355
7	41+299.043	2020.531	-0.02855	a	17.148	b	1.500	c	17.214

R. C. P. C.
LEFT CUT & RIGHT FILL - SKEW LEFT

Station 39+054.490
RCPC 1.00
t = 0.114
SSL = 2.1727 :1 SSR = 2.1727 :1
C.L. ELEV.= #######
PIPE SLOPE = -0.04000

Skew = 67 ° Left
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

SECTION A - A

Length of Pipe = 43.940 m. for left vertical
Length of Pipe = 43.942 m. for right vertical

		t =	0.63	xleft =	2.349	xright =	2.545		
		s.e.left =	-0.01031	yleft =	0.584	yright =	0.633		
		skew =	67 left		s.e.right =	-0.01031			
		slope =	0.25	4.345	SLB =	0.2716	3.6820		
		rd. width =	14.3		SLR =	2.1727	0.4603		
		half med=	2		Dg1 =	-20.924		9.497	
					Eg1 =	2063.377	SL2	2059.597	SL2
Station	39+054.490				Dg2 =	-22.086	-0.03614	55.535	-0.11404
		PGL			Eg2 =	2063.419		2054.347	
1	39+061.557	2063.08	-0.01964	a	16.649	b	7.067	c	18.087
2	39+060.560	2063.059	-0.01815	a	14.300	b	6.070	c	15.535
3	39+055.339	2062.944		a	2.000	b	0.849	c	2.173
4	39+054.490	2062.924		a		b		c	
5	39+053.641	2062.905		a	2.000	b	0.849	c	2.173
6	39+048.420	2062.783	-0.00247	a	14.300	b	6.070	c	15.535
7	39+047.340	2062.757	-0.00107	a	16.845	b	7.150	c	18.300

R. C. P. C.
LEFT CUT & RIGHT FILL - SKEW Right

Station 37+062.470
RCPC 1.00
t = 0.114
SSL = 2.0706 :1 SSR = 2.0706 :1
C.L. ELEV.= #######
PIPE SLOPE = -0.04000

Skew = 75 ° Right
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

		t =	0.63	xleft =	2.681	xright =	2.681		
		s.e.left =	0.015	yleft =	0.670	yright =	0.670		
		skew =	75	right	s.e.right =	-0.015			
		slope =	0.25	4.141	SLB =	0.2588	3.8637		
		rd. width =	14.3		SLR =	2.0706	0.4830		
		half med=	2		Dg1 =	-19.119		14.688	
					Eg1 =	2057.545	SL2	2048.802	SL2
Station	37+062.470				Dg2 =	-49.997	-0.30245	33.14	-0.16936
					Eg2 =	2066.884		2045.677	
1	37+057.920	2051.298	0.015	a	16.981	b	4.550	c	17.580
2	37+058.638	2051.269	0.015	a	14.300	b	3.832	c	14.804
3	37+061.934	2051.137		a	2.000	b	0.536	c	2.071
4	37+062.470	2051.115		a		b		c	
5	37+063.006	2051.092		a	2.000	b	0.536	c	2.071
6	37+066.302	2050.959	-0.015	a	14.300	b	3.832	c	14.804
7	37+067.020	2050.93	-0.015	a	16.981	b	4.550	c	17.580

R. C. P. C.
LEFT & RIGHT CUT - SKEW LEFT

Station 32+163.272

RCPC 1.00

t = 0.114

SSL = 2.3333 :1 SSR = 2.3333 :1

C.L. ELEV.= #######

PIPE SLOPE = -0.04000

Skew = 59 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

SECTION A - A

Length of Pipe = 48.456 m. for left vertical

Length of Pipe = 48.458 m. for right vertical

		t =	0.63	xleft =	2.165	xright =	3.014		
		s.e.left =	-0.041	yleft =	0.541	yright =	0.754		
		skew =	59 left		s.e.right =	-0.041			
		slope =	0.25	4.667	SLB =	0.2917	3.4287		
		rd. width =	14.3		SLR =	2.3333	0.4286		
		half med=	2		Dg1 =	-16.845		9.611	
					Eg1 =	2054.493	SL2	2049.737	SL2
Station	32+163.272				Dg2 =	-50	0	24.051	-0.0937
					Eg2 =	2054.493		2048.384	
1	32+173.165	2050.34	-0.041	a	16.465	b	9.893	c	19.209
2	32+171.864	2050.271	-0.041	a	14.300	b	8.592	c	16.683
3	32+164.474	2049.885		a	2.000	b	1.202	c	2.333
4	32+163.272	2049.823		a		b		c	
5	32+162.070	2049.762		a	2.000	b	1.202	c	2.333
6	32+154.680	2049.391	-0.041	a	14.300	b	8.592	c	16.683
7	32+152.869	2049.302	-0.041	a	17.314	b	10.403	c	20.199

R. C. P. C.
LEFT & RIGHT CUT - SKEW RIGHT

Station 31+936.231

RCPC 1.00

t = 0.114

SSL = 2.0706 :1 SSR = 2.0706 :1

C.L. ELEV.= #######

PIPE SLOPE = -0.04000

Skew = 75 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

		t =	0.63	xleft =	2.681	xright =	2.665		
		s.e.left =	0.015	yleft =	0.670	yright =	0.667		
		skew =	75 right		s.e.right =	-0.01252			
		slope =	0.25	4.141	SLB =	0.2588	3.8637		
		rd. width =	14.3		SLR =	2.0706	0.4830		
		half med=	2		Dg1 =	-4.083		9.579	
					Eg1 =	2042.102	SL2	2042.5	SL2
Station	31+936.231				Dg2 =	-21.235	-0.2047	20.79	0.0446
		PGL			Eg2 =	2045.613		2043	
1	31+931.681	2043.359	0.015	a	16.981	b	4.550	c	17.580
2	31+932.399	2043.362	0.015	a	14.300	b	3.832	c	14.804
3	31+935.695	2043.379		a	2.000	b	0.536	c	2.071
4	31+936.231	2043.382		a		b		c	
5	31+936.767	2043.385		a	2.000	b	0.536	c	2.071
6	31+940.063	2043.405	-0.01363	a	14.300	b	3.832	c	14.804
7	31+940.777	2043.409	-0.01383	a	16.965	b	4.546	c	17.564

Sta.
RCPC 1.00
t = 0.114
SSL = 2.0000 :1 SSR = 2.0000 :1
LOFFSET= -21.515 ROFFSET= 21.033
LLEV.= 2159.878 RLEV.= 2160.119

R. C. P. C.

Skew = 90 °
P.G.L. = 2163.000
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Sta.
RCPC 1.00
t = 0.114
SSL = 2.0000 :1 SSR = 2.0000 :1
C.L.elev.= 2160.000
Pipe slope = 0.00567

R. C. P. C.

Skew = 90 ° Normal
P.G.L. = 2163.000
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

R.C.P.C. DETAILS

INTERNAL DIAMETER D Cm	MINIMUM WALL THICKNESS T Cm	MINIMUM CIRCULAR REINFORCEMENT Sq. Cm. PER METER BARREL		JOINT DETAIL	
		INNER CAGE	OUTER CAGE	a Cm	b Cm
50	7.00	5.10	–	2.50	1.50
60	7.60	6.30	–	3.50	2.50
75	8.90	8.70	6.60	4.50	3.50
80	9.50	9.50	7.40	4.50	3.50
90	10.10	10.60	8.00	5.00	6.00
100	11.40	12.70	9.50	6.00	7.00
120	12.70	15.50	11.60	7.00	8.00
150	15.00				

R.C.P.C. PLANS & SECTIONS

R.C.P.C. 800mm.Ø Bar Bending Schedule

TOE WALL (UP STREAM / DOWN STREAM)									
LOCATION	BAR MARK	SHAPE & DIMENSIONS	SPACING (m)	SIZE (mm)	LENGTH (m)	NO. OF PIECES	TOTAL LENGTH (m)	UNIT WEIGHT (Kg/m)	WEIGHT (Kg)
INLET	Y1401	0.95 0.10 x=0.15	0.30	14	1.200	11	13.20	1.210	15.972
	Y1402	2.910	As	14	2.910	4	11.640	1.210	14.084
OUTLET	Y1401	1.95 0.10 x=0.15	0.30	14	2.200	11	24.200	1.210	29.282
	Y1402	2.910	As	14	2.910	7	20.370	1.210	24.648
								TOTAL	83.986

R.C.P.C. 1000mm.Ø Bar Bending Schedule

TOE WALL (UP STREAM / DOWN STREAM)									
LOCATION	BAR MARK	SHAPE & DIMENSIONS	SPACING (m)	SIZE (mm)	LENGTH (m)	NO. OF PIECES	TOTAL LENGTH (m)	UNIT WEIGHT (Kg/m)	WEIGHT (Kg)
INLET	Y1401	0.95 0.10 x=0.15	0.30	14	1.200	11	13.20	1.210	15.972
	Y1402	3.148	As	14	3.148	4	12.592	1.210	15.236
OUTLET	Y1401	1.95 0.10 x=0.15	0.30	14	2.200	11	24.200	1.210	29.282
	Y1402	3.148	As	14	3.148	7	22.036	1.210	26.664
								TOTAL	87.154

R.C.P.C. 1500mm.Ø Bar Bending Schedule

TOE WALL (UP STREAM / DOWN STREAM)									
LOCATION	BAR MARK	SHAPE & DIMENSIONS	SPACING (m)	SIZE (mm)	LENGTH (m)	NO. OF PIECES	TOTAL LENGTH (m)	UNIT WEIGHT (Kg/m)	WEIGHT (Kg)
INLET	Y1401	0.95 0.10 x=0.15	0.30	14	1.200	13	15.60	1.210	18.876
	Y1402	3.700	As	14	3.700	4	14.800	1.210	17.908
OUTLET	Y1401	1.95 0.10 x=0.15	0.30	14	2.200	13	28.600	1.210	34.606
	Y1402	3.700	As	14	3.700	7	25.900	1.210	31.339
								TOTAL	102.729

R. C. P. C.

Sta.
RCPC 1.50 1 Row
t = 0.15
SSL = 2.0000 :1 SSR = 2.0000 :1
C.L.elev.= 96.000
Pipe slope = 0.04000

Skew = 90 º Normal
P.G.L. = 100.000
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Outer Shoulder = 3.000
Inner Shoulder = 2.000
Shoulder Slope = 4.000

R. C. P. C.
LEFT & RIGHT FILL - SKEW

Station 37+452.180

RCPC 1.00

t = 0.114

SSL = 2.000 3.1114 → 2.0/sin 40

SSR = 2.000 3.1114 → 2.0/sin 40

Inner Shoulder = 2.000

Outer Shoulder = 3.000

Shoulder Slope = 4.000

C.L. ELEV.= 2031.802

PIPE SLOPE = 0.04000

(2.0+2.0+7.3+3.0) ← rd. width = 14.300

Skew = 40 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

(0.63/(0.25-0.06))

(3.316*0.06+0.63)

(0.63/(0.25+0.06))

(2.032*0.06+0.63)

t =	0.630	xleft =	3.316	xright =	2.032		
skew =	40	yleft =	0.829	yright =	0.508		
slope =	0.25		SLB =	0.3889	2.5711		
			SLR =	3.1115	0.3214		
			Dg1 =	-27.664		24.006	
			Eg1 =	2029.478	SL2	2032.247	SL2
			Dg2 =	-73.496	0.006	36.333	0.17271
			Eg2 =	2029.203		2034.376	

c a skew b

Station 37+452.180

			PGL	S.E.								
					14.30+3.316			17.616/tan 40		17.616/sin 40		
								14.3/tan 40		14.3/sin 40		
								2/tan 40		2/sin 40		
37+452.180 + 20.994	1	37+473.174	2034.869	0.06	a	17.616	b	20.994	c	27.405		
37+452.180 + 17.042	2	37+469.222	2035.02	0.06	a	14.300 rd. width	b	17.042	c	22.247		
37+452.180 + 2.383	3	37+454.563	2035.583		a	2.000 half med.	b	2.383	c	3.111		
	4	37+452.180	2035.674		a		b		c			
37+452.180 - 2.383	5	37+449.797	2035.766		a	2.000 half med.	b	2.383	c	3.111		
37+452.180 - 17.042	6	37+435.138	2036.327	0.06	a	14.300 rd. width	b	17.042	c	22.247		
37+452.180 - 19.464	7	37+432.716	2036.42	0.06	a	16.332	b	19.464	c	25.408		
					14.30+2.032			16.332/tan 40		16.332/sin 40		

R. C. P. C.

Sta.
RCPC 1.50 1 Row
t = 0.15
SSL = 2.0000 :1 SSR = 2.0000 :1
C.L.elev.= 96.000
Pipe slope = 0.04000

Skew = 90 ° Normal
P.G.L. = 100.000
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Outer Shoulder = 3.000
Inner Shoulder = 2.000
Shoulder Slope = 4.000

R. C. P. C.
LEFT & RIGHT FILL - SKEW

Station 37+452.180

RCPC 1.00

t = 0.114

SSL = 2.000 3.1114 → 2.0/sin 40

SSR = 2.000 3.1114 → 2.0/sin 40

Inner Shoulder = 2.000

Outer Shoulder = 3.000

Shoulder Slope = 4.000

C.L. ELEV.= 2031.802

PIPE SLOPE = 0.04000

(2.0+2.0+7.3+3.0) ← rd. width = 14.300

		Skew =	40 ° Left				
		C.W. =	7.300				
		H/MED. =	2.000				
		Layer =	0.630				
t =	0.630	xleft =	3.316	xright =	2.032		
skew =	40	yleft =	0.829	yright =	0.508		
slope =	0.25		SLB =	0.3889	2.5711		
rd. width =	14.300		SLR =	3.1115	0.3214		
half med=	2.000		Dg1 =	-27.664		24.006	
			Eg1 =	2029.478	SL2	2032.247	SL2
			Dg2 =	-73.496	0.006	36.333	0.17271
			Eg2 =	2029.203		2034.376	

(0.63/(0.25-0.06))
(3.316*0.06+0.63)
(0.63/(0.25+0.06))
(2.032*0.06+0.63)

c a skew b

Station 37+452.180

			PGL	S.E.							
					14.30+3.316			17.616/tan 40		17.616/sin 40	
								14.3/tan 40		14.3/sin 40	
								2/tan 40		2/sin 40	
37+452.180 + 20.994	1	37+473.174	2034.869	0.06	a	17.616	b	20.994	c	27.405	
37+452.180 + 17.042	2	37+469.222	2035.02	0.06	a	14.300	rd. width b	17.042	c	22.247	
37+452.180 + 2.383	3	37+454.563	2035.583		a	2.000	half med. b	2.383	c	3.111	
	4	37+452.180	2035.674		a		b		c		
37+452.180 - 2.383	5	37+449.797	2035.766		a	2.000	half med. b	2.383	c	3.111	
37+452.180 - 17.042	6	37+435.138	2036.327	0.06	a	14.300	rd. width b	17.042	c	22.247	
37+452.180 - 19.464	7	37+432.716	2036.42	0.06	a	16.332	b	19.464	c	25.408	
					14.30+2.032			16.332/tan 40		16.332/sin 40	

R. C. P. C.
LEFT & RIGHT FILL - SKEW LEFT

Station 37+452.180

RCPC 1.00

t = 0.114

SSL = 3.1114 :1 SSR = 3.1114 :1

C.L. ELEV.= 2031.802

PIPE SLOPE = 0.04000

Skew = 40 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

t =	0.630	xleft =	3.316	xright =	2.032				
s.e.left =	0.06	yleft =	0.829	yright =	0.508				
skew =	40	left	s.e.right =	0.06					
slope =	0.25	6.223	SLB =	0.3889	2.5711				
rd. width =	14.300		SLR =	3.1115	0.3214				
half med=	2.000		Dg1 =	-27.664		24.006			
			Eg1 =	2029.478	SL2	2032.247	SL2		
			Dg2 =	-73.496	0.006	36.333	0.17271		
			Eg2 =	2029.203		2034.376			

Station 37+452.180

		PGL	S.E.						
1	37+473.174	2034.869	0.06	a	17.616	b	20.994	c	27.405
2	37+469.222	2035.02	0.06	a	14.300	b	17.042	c	22.247
3	37+454.563	2035.583		a	2.000	b	2.383	c	3.111
4	37+452.180	2035.674		a		b		c	
5	37+449.797	2035.766		a	2.000	b	2.383	c	3.111
6	37+435.138	2036.327	0.06	a	14.300	b	17.042	c	22.247
7	37+432.716	2036.42	0.06	a	16.332	b	19.464	c	25.408

SECTION A - A

Length of Pipe = 71.315 m. for left vertical

Length of Pipe = 70.922 m. for right vertical

PLAN

R. C. P. C.
LEFT & RIGHT FILL - SKEW Right

Station 37+836.740

RCPC 1.00

t = 0.114

SSL = 2.3094 :1 SSR = 2.3094 :1

C.L. ELEV.= 2021.000

PIPE SLOPE = -0.04000

Skew = 60 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

t =	0.630	xleft =	2.921	xright =	2.203				
s.e.left =	0.036	yleft =	0.727	yright =	0.551				
skew =	60 right		s.e.right =	0.036					
slope =	0.25	4.619	SLB =	0.2887	3.4641				
rd. width =	14.30		SLR =	2.3094	0.4330				
half med=	2.00		Dg1 =	-24.59		24.268			
			Eg1 =	2019.202	SL2	2018.666	SL2		
			Dg2 =	-38.917	-0.02457	63.263	-0.01459		
			Eg2 =	2019.554		2018.097			

Station 37+836.740

		PGL	SLOPE						
1	37+826.797	2026.675	0.033241	a	17.221	b	9.943	c	19.885
2	37+828.484	2026.674	0.034345	a	14.300	b	8.256	c	16.512
3	37+835.585	2026.676		a	2.000	b	1.155	c	2.309
4	37+836.740	2026.677		a		b		c	
5	37+837.895	2026.678		a	2.000	b	1.155	c	2.309
6	37+844.996	2026.689	0.036	a	14.300	b	8.256	c	16.512
7	37+846.268	2026.691	0.036	a	16.503	b	9.528	c	19.056

SECTION A - A

Length of Pipe = 61.778 m. for left vertical

Length of Pipe = 61.994 m. for right vertical

PLAN

R. C. P. C.
LEFT FILL & RIGHT CUT - SKEW LEFT

Station 35+003.205

RCPC 1.00

t = 0.114

SSL = 2.9889 :1 SSR = 2.9889 :1

C.L. ELEV.= 2121.657

PIPE SLOPE = 0.04000

Skew = 42 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

t =	0.630	xleft =	2.086	xright =	2.865				
s.e.left =	-0.052	yleft =	0.522	yright =	0.702				
skew =	42 left		s.e.right =	-0.052					
slope =	0.25	5.978	SLB =	0.3736	2.6765				
rd. width =	14.30		SLR =	2.9890	0.3346				
half med=	2.00		Dg1 =	-18.713		16.958			
			Eg1 =	2121.886	SL2	2123.703	SL2		
			Dg2 =	-42.535	0.11259	50	0		
			Eg2 =	2119.204		2123.703			

Station 35+003.205

		PGL	SLOPE						
1	35+021.404	2122.563	-0.052	a	16.386	b	18.199	c	24.489
2	35+019.087	2122.679	-0.052	a	14.300	b	15.882	c	21.371
3	35+005.426	2123.414		a	2.000	b	2.221	c	2.989
4	35+003.205	2123.541		a		b		c	
5	35+000.984	2123.671		a	2.000	b	2.221	c	2.989
6	34+987.323	2124.515	-0.03014	a	14.300	b	15.882	c	21.371
7	34+984.141	2124.724	-0.02497	a	17.165	b	19.064	c	25.653

SECTION A - A

Length of Pipe = 55.728 m. for left vertical

Length of Pipe = 55.365 m. for right vertical

PLAN

R. C. P. C.
LEFT FILL & RIGHT CUT - SKEW Right

Station 41+297.543

RCPC 1.00

t = 0.114

SSL = 2.0076 :1 SSR = 2.0076 :1

C.L. ELEV.= 2017.123

PIPE SLOPE = 0.04000

Skew = 85 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

t =	0.630	xleft =	2.239	xright =	2.848				
s.e.left =	-0.03011	yleft =	0.559	yright =	0.711				
skew =	85 right		s.e.right =	-0.03011					
slope =	0.25	4.015	SLB =	0.2510	3.9848				
rd. width =	14.30		SLR =	2.0076	0.4981				
half med=	2.00		Dg1 =	-20.03		9.457			
			Eg1 =	2018.414	SL2	2025.01	SL2		
			Dg2 =	-23.568	0.00254	23.85	0.27034		
			Eg2 =	2018.405		2028.901			

Station 41+297.543

		PGL	SLOPE						
1	41+296.096	2020.632	-0.03161	a	16.539	b	1.447	c	16.602
2	41+296.292	2020.625	-0.0314	a	14.300	b	1.251	c	14.355
3	41+297.368	2020.589		a	2.000	b	0.175	c	2.008
4	41+297.543	2020.583		a		b		c	
5	41+297.718	2020.577		a	2.000	b	0.175	c	2.008
6	41+298.794	2020.54	-0.02881	a	14.300	b	1.251	c	14.355
7	41+299.043	2020.531	-0.02855	a	17.148	b	1.500	c	17.214

SECTION A - A

Length of Pipe = 43.426 m. for left vertical

Length of Pipe = 43.264 m. for right vertical

PLAN

R. C. P. C.

LEFT CUT & RIGHT FILL - SKEW LEFT

Station 39+054.490

RCPC 1.00

t = 0.114

SSL = 2.1727 :1 SSR = 2.1727 :1

C.L. ELEV.= 2060.500

PIPE SLOPE = -0.04000

Skew = 67 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

t =	0.630	xleft =	2.349	xright =	2.545			
s.e.left =	-0.01031	yleft =	0.584	yright =	0.633			
skew =	67 left		s.e.right =	-0.01031				
slope =	0.25	4.345	SLB =	0.2716	3.6820			
rd. width =	14.30		SLR =	2.1727	0.4603			
half med=	2.00		Dg1 =	-20.924		9.497		
			Eg1 =	2063.377	SL2	2059.597	SL2	
			Dg2 =	-22.086	-0.03614	55.535	-0.11404	
			Eg2 =	2063.419		2054.347		

Station 39+054.490

		PGL	SLOPE						
1	39+061.557	2063.08	-0.01964	a	16.649	b	7.067	c	18.087
2	39+060.560	2063.059	-0.01815	a	14.300	b	6.070	c	15.535
3	39+055.339	2062.944		a	2.000	b	0.849	c	2.173
4	39+054.490	2062.924		a		b		c	
5	39+053.641	2062.905		a	2.000	b	0.849	c	2.173
6	39+048.420	2062.783	-0.00247	a	14.300	b	6.070	c	15.535
7	39+047.340	2062.757	-0.00107	a	16.845	b	7.150	c	18.300

SECTION A - A

Length of Pipe = 42.573 m. for left vertical

Length of Pipe = 42.764 m. for right vertical

PLAN

R. C. P. C.
LEFT CUT & RIGHT FILL - SKEW Right

Station 37+062.470

RCPC 1.00

t = 0.114

SSL = 2.0706 :1 SSR = 2.0706 :1

C.L. ELEV.= 2049.000

PIPE SLOPE = -0.04000

Skew = 75 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

t =	0.630	xleft =	2.681	xright =	2.681				
s.e.left =	0.015	yleft =	0.670	yright =	0.670				
skew =	75 right		s.e.right =		-0.015				
slope =	0.25	4.141	SLB =	0.2588	3.8637				
rd. width =	14.30		SLR =	2.0706	0.4830				
half med=	2.00		Dg1 =	-19.119		14.688			
			Eg1 =	2057.545	SL2	2048.802	SL2		
			Dg2 =	-49.997	-0.30245	33.14	-0.16936		
			Eg2 =	2066.884		2045.677			

Station 37+062.470

		PGL	SLOPE						
1	37+057.920	2051.298	0.015	a	16.981	b	4.550	c	17.580
2	37+058.638	2051.269	0.015	a	14.300	b	3.832	c	14.804
3	37+061.934	2051.137		a	2.000	b	0.536	c	2.071
4	37+062.470	2051.115		a		b		c	
5	37+063.006	2051.092		a	2.000	b	0.536	c	2.071
6	37+066.302	2050.959	-0.015	a	14.300	b	3.832	c	14.804
7	37+067.020	2050.93	-0.015	a	16.981	b	4.550	c	17.580

SECTION A - A

Length of Pipe = 38.154 m. for left vertical

Length of Pipe = 38.328 m. for right vertical

PLAN

R. C. P. C.
LEFT & RIGHT CUT - SKEW LEFT

Station 32+163.272

RCPC 1.00

t = 0.114

SSL = 2.3333 :1 SSR = 2.3333 :1

C.L. ELEV.= 2048.000

PIPE SLOPE = -0.05000

Skew = 59 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

t =	0.630	xleft =	2.165	xright =	3.014			
s.e.left =	-0.041	yleft =	0.541	yright =	0.754			
skew =	59 left		s.e.right =		-0.041			
slope =	0.25	4.667	SLB =		0.2917	3.4287		
rd. width =	14.30		SLR =		2.3333	0.4286		
half med=	2.00		Dg1 =		-16.845		9.611	
			Eg1 =		2054.493	SL2	2049.737	SL2
			Dg2 =		-50	0	24.051	-0.0937
			Eg2 =		2054.493		2048.384	

Station 32+163.272

		PGL	SLOPE						
1	32+173.165	2050.34	-0.041	a	16.465	b	9.893	c	19.209
2	32+171.864	2050.271	-0.041	a	14.300	b	8.592	c	16.683
3	32+164.474	2049.885		a	2.000	b	1.202	c	2.333
4	32+163.272	2049.823		a		b		c	
5	32+162.070	2049.762		a	2.000	b	1.202	c	2.333
6	32+154.680	2049.391	-0.041	a	14.300	b	8.592	c	16.683
7	32+152.869	2049.302	-0.041	a	17.314	b	10.403	c	20.199

SECTION A - A

Length of Pipe = 40.697 m. for left vertical

Length of Pipe = 40.973 m. for right vertical

PLAN

R. C. P. C.
LEFT & RIGHT CUT - SKEW RIGHT

Station 31+936.231

RCPC 1.00

t = 0.114

SSL = 2.0706 :1 SSR = 2.0706 :1

C.L. ELEV.= 2040.567

PIPE SLOPE = -0.04000

Skew = 75 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

t =	0.630	xleft =	2.681	xright =	2.665				
s.e.left =	0.015	yleft =	0.670	yright =	0.667				
skew =	75 Right		s.e.right =	-0.01252					
slope =	0.25	4.141	SLB =	0.2588	3.8637				
rd. width =	14.30		SLR =	2.0706	0.4830				
half med=	2.00		Dg1 =	-4.083		9.579			
			Eg1 =	2042.102	SL2	2042.5	SL2		
			Dg2 =	-21.235	-0.2047	20.79	0.044599		
			Eg2 =	2045.613		2043			

Station 31+936.231

		PGL	SLOPE							
1	31+931.681	2043.359	0.015	a	16.981	b	4.550	c	17.580
2	31+932.399	2043.362	0.015	a	14.300	b	3.832	c	14.804
3	31+935.695	2043.379		a	2.000	b	0.536	c	2.071
4	31+936.231	2043.382		a		b		c	
5	31+936.767	2043.385		a	2.000	b	0.536	c	2.071
6	31+940.063	2043.405	-0.01363	a	14.300	b	3.832	c	14.804
7	31+940.777	2043.409	-0.01383	a	16.965	b	4.546	c	17.564

SECTION A - A

Length of Pipe = 39.737 m. for left vertical

Length of Pipe = 39.910 m. for right vertical

PLAN

R. C. P. C.
LEFT & RIGHT FILL - SKEW LEFT

Station 37+452.180

RCPC 1.00

t = 0.114

SSL = 3.1114 :1 SSR = 3.1114 :1

C.L. ELEV.= #######

PIPE SLOPE = 0.04000

Skew = 40 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

SECTION A - A

Length of Pipe = 71.147 m. for left vertical

Length of Pipe = 71.143 m. for right vertical

		t =	0.630	xleft =	3.316	xright =	2.032		
		s.e.left =	0.06	yleft =	0.829	yright =	0.508		
		skew =	40 left		s.e.right =	0.06			
		slope =	0.25	6.223	SLB =	0.3889	2.5711		
		rd. width =	14.300		SLR =	3.1115	0.3214		
		half med=	2.000		Dg1 =	-27.664		24.006	
					Eg1 =	2029.478	SL2	2032.247	SL2
Station	37+452.180				Dg2 =	-73.496	0.006	36.333	0.17271
		PGL	S.E.		Eg2 =	2029.203		2034.376	
1	37+473.174	2034.869	0.06	a	17.616	b	20.994	c	27.405
2	37+469.222	2035.02	0.06	a	14.300	b	17.042	c	22.247
3	37+454.563	2035.583		a	2.000	b	2.383	c	3.111
4	37+452.180	2035.674		a		b		c	
5	37+449.797	2035.766		a	2.000	b	2.383	c	3.111
6	37+435.138	2036.327	0.06	a	14.300	b	17.042	c	22.247
7	37+432.716	2036.42	0.06	a	16.332	b	19.464	c	25.408

R. C. P. C.
LEFT & RIGHT FILL - SKEW Right

Station 37+836.740

RCPC 1.00

t = 0.114

SSL = 2.3094 :1 SSR = 2.3094 :1

C.L. ELEV.= #######

PIPE SLOPE = -0.04000

Skew = 60 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

SECTION A - A

Length of Pipe = 61.896 m. for left vertical

Length of Pipe = 61.898 m. for right vertical

		t =	0.63	xleft =	2.921	xright =	2.203		
		s.e.left =	0.036	yleft =	0.727	yright =	0.551		
		skew =	60 right		s.e.right =	0.036			
		slope =	0.25	4.619	SLB =	0.2887	3.4641		
		rd. width =	14.3		SLR =	2.3094	0.4330		
		half med=	2		Dg1 =	-24.59		24.268	
					Eg1 =	2019.202	SL2	2018.666	SL2
Station	37+836.740				Dg2 =	-38.917	-0.02457	63.263	-0.01459
					Eg2 =	2019.554		2018.097	
1	37+826.797	2026.675	0.033241	a	17.221	b	9.943	c	19.885
2	37+828.484	2026.674	0.034345	a	14.300	b	8.256	c	16.512
3	37+835.585	2026.676		a	2.000	b	1.155	c	2.309
4	37+836.740	2026.677		a		b		c	
5	37+837.895	2026.678		a	2.000	b	1.155	c	2.309
6	37+844.996	2026.689	0.036	a	14.300	b	8.256	c	16.512
7	37+846.268	2026.691	0.036	a	16.503	b	9.528	c	19.056

R. C. P. C.
LEFT FILL & RIGHT CUT - SKEW LEFT

Station 35+003.205

RCPC 1.00

t = 0.114

SSL = 2.9889 :1 SSR = 2.9889 :1

C.L. ELEV.= #######

PIPE SLOPE = 0.04000

Skew = 42 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

SECTION A - A

Length of Pipe = 55.572 m. for left vertical

Length of Pipe = 55.569 m. for right vertical

		t =	0.63	xleft =	2.086	xright =	2.865		
		s.e.left =	-0.052	yleft =	0.522	yright =	0.702		
		skew =	42 left		s.e.right =	-0.052			
		slope =	0.25	5.978	SLB =	0.3736	2.6765		
		rd. width =	14.3		SLR =	2.9890	0.3346		
		half med=	2		Dg1 =	-18.713		16.958	
					Eg1 =	2121.886	SL2	2123.703	SL2
Station	35+003.205				Dg2 =	-42.535	0.112585	50	0
					Eg2 =	2119.204		2123.703	
1	35+021.404	2122.563	-0.052	a	16.386	b	18.199	c	24.489
2	35+019.087	2122.679	-0.052	a	14.300	b	15.882	c	21.371
3	35+005.426	2123.414		a	2.000	b	2.221	c	2.989
4	35+003.205	2123.541		a		b		c	
5	35+000.984	2123.671		a	2.000	b	2.221	c	2.989
6	34+987.323	2124.515	-0.03014	a	14.300	b	15.882	c	21.371
7	34+984.141	2124.724	-0.02497	a	17.165	b	19.064	c	25.653

R. C. P. C.
LEFT FILL & RIGHT CUT - SKEW Right

Station 41+297.543

RCPC 1.00

t = 0.114

SSL = 2.0076 :1 SSR = 2.0076 :1

C.L. ELEV.= #######

PIPE SLOPE = 0.04000

Skew = 85 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

SECTION A - A

Length of Pipe = 43.353 m. for left vertical

Length of Pipe = 43.351 m. for right vertical

		t =	0.63	xleft =	2.239	xright =	2.848		
		s.e.left =	-0.03011	yleft =	0.559	yright =	0.711		
		skew =	85 right		s.e.right =	-0.03011			
		slope =	0.25	4.015	SLB =	0.2510	3.9848		
		rd. width =	14.3		SLR =	2.0076	0.4981		
		half med=	2		Dg1 =	-20.03		9.457	
					Eg1 =	2018.414	SL2	2025.01	SL2
Station	41+297.543				Dg2 =	-23.568	0.002544	23.85	0.27034
					Eg2 =	2018.405		2028.901	
1	41+296.096	2020.632	-0.03161	a	16.539	b	1.447	c	16.602
2	41+296.292	2020.625	-0.0314	a	14.300	b	1.251	c	14.355
3	41+297.368	2020.589		a	2.000	b	0.175	c	2.008
4	41+297.543	2020.583		a		b		c	
5	41+297.718	2020.577		a	2.000	b	0.175	c	2.008
6	41+298.794	2020.54	-0.02881	a	14.300	b	1.251	c	14.355
7	41+299.043	2020.531	-0.02855	a	17.148	b	1.500	c	17.214

R. C. P. C.
LEFT CUT & RIGHT FILL - SKEW LEFT

Station 39+054.490
RCPC 1.00
t = 0.114
SSL = 2.1727 :1 SSR = 2.1727 :1
C.L. ELEV.= #######
PIPE SLOPE = -0.04000

Skew = 67 ° Left
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

SECTION A - A

Length of Pipe = 42.678 m. for left vertical
Length of Pipe = 42.680 m. for right vertical

		t =	0.63	xleft =	2.349	xright =	2.545		
		s.e.left =	-0.01031	yleft =	0.584	yright =	0.633		
		skew =	67 left		s.e.right =	-0.01031			
		slope =	0.25	4.345	SLB =	0.2716	3.6820		
		rd. width =	14.3		SLR =	2.1727	0.4603		
		half med=	2		Dg1 =	-20.924		9.497	
					Eg1 =	2063.377	SL2 -0.03614	2059.597	SL2 -0.11404
Station	39+054.490				Dg2 =	-22.086		55.535	
		PGL			Eg2 =	2063.419		2054.347	
1	39+061.557	2063.08	-0.01964	a	16.649	b	7.067	c	18.087
2	39+060.560	2063.059	-0.01815	a	14.300	b	6.070	c	15.535
3	39+055.339	2062.944		a	2.000	b	0.849	c	2.173
4	39+054.490	2062.924		a		b		c	
5	39+053.641	2062.905		a	2.000	b	0.849	c	2.173
6	39+048.420	2062.783	-0.00247	a	14.300	b	6.070	c	15.535
7	39+047.340	2062.757	-0.00107	a	16.845	b	7.150	c	18.300

R. C. P. C.
LEFT CUT & RIGHT FILL - SKEW Right

Station 37+062.470

RCPC 1.00

t = 0.114

SSL = 2.0706 :1 SSR = 2.0706 :1

C.L. ELEV.= #######

PIPE SLOPE = -0.04000

Skew = 75 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

SECTION A - A

Length of Pipe = 38.249 m. for left vertical

Length of Pipe = 38.251 m. for right vertical

		t =	0.63	xleft =	2.681	xright =	2.681		
		s.e.left =	0.015	yleft =	0.670	yright =	0.670		
		skew =	75	right	s.e.right =	-0.015			
		slope =	0.25	4.141	SLB =	0.2588	3.8637		
		rd. width =	14.3		SLR =	2.0706	0.4830		
		half med=	2		Dg1 =	-19.119		14.688	
					Eg1 =	2057.545	SL2	2048.802	SL2
Station	37+062.470				Dg2 =	-49.997	-0.30245	33.14	-0.16936
					Eg2 =	2066.884		2045.677	
1	37+057.920	2051.298	0.015	a	16.981	b	4.550	c	17.580
2	37+058.638	2051.269	0.015	a	14.300	b	3.832	c	14.804
3	37+061.934	2051.137		a	2.000	b	0.536	c	2.071
4	37+062.470	2051.115		a		b		c	
5	37+063.006	2051.092		a	2.000	b	0.536	c	2.071
6	37+066.302	2050.959	-0.015	a	14.300	b	3.832	c	14.804
7	37+067.020	2050.93	-0.015	a	16.981	b	4.550	c	17.580

R. C. P. C.
LEFT & RIGHT CUT - SKEW LEFT

Station 32+163.272

RCPC 1.00

t = 0.114

SSL = 2.3333 :1 SSR = 2.3333 :1

C.L. ELEV.= #######

PIPE SLOPE = -0.05000

Skew = 59 ° Left

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

SECTION A - A

Length of Pipe = 40.853 m. for left vertical

Length of Pipe = 40.856 m. for right vertical

		t =	0.63	xleft =	2.165	xright =	3.014		
		s.e.left =	-0.041	yleft =	0.541	yright =	0.754		
		skew =	59 left		s.e.right =	-0.041			
		slope =	0.25	4.667	SLB =	0.2917	3.4287		
		rd. width =	14.3		SLR =	2.3333	0.4286		
		half med=	2		Dg1 =	-16.845		9.611	
					Eg1 =	2054.493	SL2	2049.737	SL2
Station	32+163.272				Dg2 =	-50	0	24.051	-0.0937
					Eg2 =	2054.493		2048.384	
1	32+173.165	2050.34	-0.041	a	16.465	b	9.893	c	19.209
2	32+171.864	2050.271	-0.041	a	14.300	b	8.592	c	16.683
3	32+164.474	2049.885		a	2.000	b	1.202	c	2.333
4	32+163.272	2049.823		a		b		c	
5	32+162.070	2049.762		a	2.000	b	1.202	c	2.333
6	32+154.680	2049.391	-0.041	a	14.300	b	8.592	c	16.683
7	32+152.869	2049.302	-0.041	a	17.314	b	10.403	c	20.199

R. C. P. C.
LEFT & RIGHT CUT - SKEW RIGHT

Station 31+936.231

RCPC 1.00

t = 0.114

SSL = 2.0706 :1 SSR = 2.0706 :1

C.L. ELEV.= #######

PIPE SLOPE = -0.04000

Skew = 75 ° Right

C.W. = 7.300

H/MED. = 2.000

Layer = 0.630

SECTION A - A

Length of Pipe = 39.832 m. for left vertical

Length of Pipe = 39.833 m. for right vertical

		t =	0.63	xleft =	2.681	xright =	2.665		
		s.e.left =	0.015	yleft =	0.670	yright =	0.667		
		skew =	75	right	s.e.right =	-0.01252			
		slope =	0.25	4.141	SLB =	0.2588	3.8637		
		rd. width =	14.3		SLR =	2.0706	0.4830		
		half med=	2		Dg1 =	-4.083		9.579	
					Eg1 =	2042.102	SL2	2042.5	SL2
Station	31+936.231				Dg2 =	-21.235	-0.2047	20.79	0.0446
		PGL			Eg2 =	2045.613		2043	
1	31+931.681	2043.359	0.015	a	16.981	b	4.550	c	17.580
2	31+932.399	2043.362	0.015	a	14.300	b	3.832	c	14.804
3	31+935.695	2043.379		a	2.000	b	0.536	c	2.071
4	31+936.231	2043.382		a		b		c	
5	31+936.767	2043.385		a	2.000	b	0.536	c	2.071
6	31+940.063	2043.405	-0.01363	a	14.300	b	3.832	c	14.804
7	31+940.777	2043.409	-0.01383	a	16.965	b	4.546	c	17.564

Suprv'g. Consultant : 0	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : **TAIF - AL BAHA ABHA ROAD**
Item : **60806 CONCRETE PIPE CULVERT DIA. 1500MM**

Page: __1_ of _1_
Drwg. No. _____

60806 CONCRETE PIPE CULVERT DIA. 1500MM

SUMMARY

Item No.	DESCRIPTION	UNIT	TOTAL	REMARKS
60806	CONCRETE PIPE CULVERT DIA.1500MM	LIN.M.	87.724	
	Grand total	M²	87.724	

Suprv'g. Consultant : 0	TAIF - AL BAHA ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g Consultant: 0	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF - AL BAHA ABHA ROAD

Item : 60806 CONCRETE PIPE CULVERT DIA.1500MM

Page 1 of 1

Drwg. No.

Date:

60806 CONCRETE PIPE CULVERT DIA.1500MM

R.C.P.C. = 2 x 1500 mm Ø

CONCRETE RCPC 2 x 1500 mm.Ø

LOCATION	UNIT	EACH	LENGTH	LENGTH (LIN.M.)
1+150 Main Road	L.M	2	43.862	87.724

Consultant 0	TAIF - AL BAHA ABHA ROAD	Consultant: M. A. AL SWAILEM CO.
Q.S. Res. Engineer		Q.S. Proj. Manager

Suprv'g Consultant:	KINGDOM OF SAUDI ARABIA	Contractor:
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	*M. A. AL SWAILEM CO.*

FINAL QUANTITIES

الكميات النهائية

Project: TAIF - AL BAHA ABHA ROAD

Page 1 of 1
Drwg. No.
Date:

R. C. P. C.

Sta. 1 + 500.000

RCPC 1.50 3 Row

t = 0.15
SSL = 2.0000 :1 SSR = 2.0000 :1
C.L.elev.= 96.000
Pipe slope = 0.04000

Skew = 90 ° Normal
P.G.L. = 100.000
SL = 0.0150 SR = -0.0150
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Outer Shoulder = 3.000
Inner Shoulder = 2.000
Shoulder Slope = 4.000

Consultant:		TAIF - AL BAHA ABHA ROAD	Consultant:	
ITAL CONSULT			*M. AL SWAILEM CO.*	
Q.S.	Res. Engineer		Q.S.	Proj. Manager

2090102 STRUCTURAL EXCAVATION (RCPC 1 x 800mm. Ø, TOE WALL)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
2090102	STRUCTURAL EXCAVATION	M³	7.239	
	Grand total	M³	7.239	

Suprv'g Consultant: 0	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF - AL BAHA ABHA ROAD

Item : 2090102 STRUCTURAL EXCAVATION FOR OTHERS

Drwg. No.

Date:

2090102 STRUCTURAL EXCAVATION FOR OTHERS

NOTE:
A1 & A2 & WIDTH = CONSTANT

Structure: RCPC 2 x 1500 mm.Ø

LOCATION	A1	A2	WIDTH	VOLUME(m³)
1+150 Main Road	0.894	0.344	5.850	7.239

Consultant 0	TAIF - AL BAHA ABHA ROAD	Consultant: M. A. AL SWAILEM CO.
Q.S. Res. Engineer		Q.S. Proj. Manager

Suprv'g Consultant: 0	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF - AL BAHA ABHA ROAD

Item : 2090102 STRUCTURAL EXCAVATION FOR OTHERS

Page 1 of 1

Drwg. No.

Date:

2090102 STRUCTURAL EXCAVATION FOR OTHERS

LONGITUDINAL SECTION

P L A N

REINFORCED CONCRETE PIPE BEDDING DETAIL

Consultant 0	TAIF - AL BAHA ABHA ROAD	Consultant: M. A. AL SWAILEM CO.
Q.S. Res. Engineer		Q.S. Proj. Manager

Suprv'g. Consultant : 0	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : **TAIF - AL BAHA ABHA ROAD** Page: __1_ of _1_
Item : **60605 R. C. SLOPE PROTECTION** Drwg. No. _____

60605 R. C. SLOPE PROTECTION

SUMMARY

Item No.	DESCRIPTION	UNIT	TOTAL	REMARKS
60605	R.C. SLOPE PROTECTION	M²	14.689	
	Grand total	M²	14.689	

Suprv'g. Consultant : 0	TAIF - AL BAHA ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : 0	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : TAIF - AL BAHA ABHA ROAD — Page: of

Item : 60605 R. C. SLOPE PROTECTION — Drwg. No.

60605 R. C. SLOPE PROTECTION

Structure: RCPC 1 x 1000 mmØ

STA. 293+100 (Normal skew)

Sectional Details

Depth:

Slope =	4 : 1		U/S=	1.00	m.	A=	1.000	m.	a = B/2	=	2.532
I.D =	1.00	m.	D/S=	2.00	m.	B=	5.063	m.	b = O.D./2	=	0.614
T =	0.114	m.	T1=	0.15	m.	C=	3.228	m.			
O.D =	1.228	m.	T2=	0.25	m.	L=	6.063	m.			

Area of Ellipse = ¶ x ab

where:

1	2	3	4	5	6	7	8	9 = 2*3*5
Member	Slope Length L	Width, C	T1 or T2	No. of Panel	Value of Pi	R = a	R = b	TOTAL AREA (SQ. M.)
Concrete Slope Protection:								
1. SLAB								
	6.063	3.228	0.150	1				19.572
2. Less: opening								
1	2	3	4	5	6	7	8	9 = 3*5*6*7*8
		no. of pipe	T1 or T2	No. of Panel	Value of Pi	R = a	R = b	TOTAL AREA (SQ. M.)
	ELLIPSE	1	0.150	1	3.1416	2.532	0.614	-4.883
							TOTAL AREA =	**14.689**

Suprv'g. Consultant : 0	TAIF - AL BAHA ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor :
0		M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : **TAIF - AL BAHA ABHA ROAD** Page: _1__ of _1__

Item : *5030301 CONCRETE FOR R.C. PIPE CULVERT* Drwg. No. _____

5030301 CONCRETE FOR R.C. PIPE CULVERT

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
5030301	CONCRETE FOR R.C. PIPE CULVERT	M³	3.291	
	Grand total	M³	3.291	

Suprv'g. Consultant :		TAIF - AL BAHA ABHA ROAD	Contractor :	
0			M. A. AL SWAILEM CO.	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g Consultant: 0	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF - AL BAHA ABHA ROAD

Item : 5030301 CONCRETE FOR R.C. PIPE CULVERT

Page 1 of 1

Drwg. No.

Date:

5030301 CONCRETE FOR R.C. PIPE CULVERT

Structure: RCPC 2 x 1500 mm.Ø

LOCATION	A1	A2	WIDTH	VOLUME(m³)
1+150 Main Road	0.406	0.156	5.850	3.291

Consultant 0	TAIF - AL BAHA ABHA ROAD	Consultant: M. A. AL SWAILEM CO.
Q.S. Res. Engineer		Q.S. Proj. Manager

Suprv'g Consultant: 0	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF - AL BAHA ABHA ROAD

Item : 2090102 STRUCTURAL EXCAVATION FOR OTHERS

Page 1 of 1

Drwg. No.

Date:

2090102 STRUCTURAL EXCAVATION FOR OTHERS

LONGITUDINAL SECTION

P L A N

REINFORCED CONCRETE PIPE BEDDING DETAIL

Consultant 0	TAIF - AL BAHA ABHA ROAD	Consultant: M. A. AL SWAILEM CO.
Q.S. Res. Engineer		Q.S. Proj. Manager

Suprv'g. Consultant : 0	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : **TAIF - AL BAHA ABHA ROAD** Page: _1__ of _1__

Item : **50201 REINFORCING STEEL , Grade 60** Drwg. No. _____

50201 REINFORCING STEEL , Grade 60

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
50201	REINFORCING STEEL , Grade 60	Ton	0.087	
	Grand total	Ton	0.087	

Suprv'g. Consultant : 0	TAIF - AL BAHA ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g Consultant: 0	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF - AL BAHA ABHA ROAD

Item : 50201 REINFORCING STEEL , Grade 60

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Drwg. No.

Date:

50201 REINFORCING STEEL , Grade 60

R.C.P.C. = 1 x 1000 mm Ø

TOE WALL REINFORCEMENT

LOCATION	BAR MARK	SHAPE & DIMENSIONS	SPACING (m)	SIZE (mm)	LENGTH (m)	NO. OF PIECES	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	WEIGHT (kgs)
INLET	Y1401	0.10 / 0.95 / 0.15	0.30	14	1.200	11	13.200	1.210	15.972
	Y1402	3.148	AS	14	3.148	4	12.592	1.210	15.236
OUTLET	Y1401	0.10 / 1.95 / 0.15	0.30	14	2.200	11	24.200	1.210	29.282
	Y1402	3.148	AS	14	3.148	7	22.036	1.210	26.664
								TOTAL =	87.154

Consultant 0	TAIF - AL BAHA ABHA ROAD	Consultant: M. A. AL SWAILEM CO.
Q.S. Res. Engineer		Q.S. Proj. Manager

Suprv'g Consultant: 0	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF - AL BAHA ABHA ROAD

Item : 50201 REINFORCING STEEL , Grade 60

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Drwg. No.

Date:

50201 REINFORCING STEEL , Grade 60

LONGITUDINAL SECTION

P L A N

REINFORCED CONCRETE PIPE BEDDING DETAIL

Consultant 0	TAIF - AL BAHA ABHA ROAD	Consultant: M. A. AL SWAILEM CO.
Q.S. Res. Engineer		Q.S. Proj. Manager

Station **0+350**

1-CELL

RCBC **1 - 1.50 x 0.95**

R. C. B. C.

T1 = 0.26 W1 = 0.22
T2 = 0.22 W2 = 0.00
SSL = 4.0000 SSR = 4.0000
Inner Shoulder = 0.000
Outer Shoulder = 3.000
Shoulder Slope = 6.000
C.L.elev.= 8.936
B.C. slope = -0.00500

Skew = 90 ° Normal
P.G.L. = 10.539
SL = 0.015000 SR = -0.015000
C.W. = 18.250
H/MED. = 0.000
Layer = 0.850

Station 0+350 **skew 90° Normal**

	S	H	T1	T2	W1	W2	NON-STANDARD		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1=P2	No. of Pane	TOTAL
1	1.50	0.95	0.26	0.22	0.22	0.00	0.25	1.94	20.000	2	40.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1=P2 20.000 m.	A	0.465 / 0.71	0.4	14	1.170	0.00	1.17	51 x 8 = 408	477.360	1.21	577.606
	B	1.86 / x=0.25	0.4	14	2.36	0	2.36	51 x 4 = 204	481.440	1.21	582.542
	D	1.86	0.14	16	1.86	0	1.86	143 x 4 = 572	1063.920	1.58	1680.994
	F	x=0.25 / 1.31	0.4	14	1.81	0	1.81	51 x 4 = 204	369.240	1.21	446.780
	G	x=0.25 / 1.31	0.44	14	1.56	0	1.56	46 x 4 = 184	287.040	1.21	347.318
	LONG'NAL 40.000	12 / 29.580 D.I.= 60 x Ø	VAR.	14	41.580	0	41.580	11+14+7*2 39	1621.620	1.21	1962.160
										SUB TOTAL =	5597.401

Station 0+350 **skew 90 ° Normal**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL		NON-STANDARD	X	BARREL LENGTH P2		TOTAL
1	1.50	0.95	0.26	0.22	0.22			1.94	7.167		7.167

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 7.167 m.	A	0.465 0.71	0.4	14	1.170	0.00	1.17	19 x 4 = 76	88.92	1.21	107.593
	B	1.86 x=0.25	0.4	14	2.36	0	2.36	19 x 2 = 38	89.68	1.21	108.513
	D	1.86	0.14	16	1.86	0	1.86	52 x 2 = 104	193.440	1.58	305.635
	F	x=0.25 1.31	0.4	14	1.81	0	1.81	19 x 2 = 38	68.78	1.21	83.224
	G	x=0.25 1.31	0.44	14	1.56	0	1.56	17 x 2 = 34	53.04	1.21	64.178
	LONG'NAL 7.167	0 7.067 O.I.= 60 x Ø	VAR.	14	7.067	0	7.067	11+14+7*2 39	275.613	1.21	333.492
										SUB TOTAL =	**1002.635**

Station 0+350 **skew 90° Normal**

NON-STANDARD

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS		X	xs
1	1.50	0.95	0.22	0.00	0.26	0.20	0.55	0.22		1.940	1.940

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.313 0.14	0.3	12	1.107	0	1.107	7 x 4 = 28	30.987	0.888	27.516
	E101	1.860	-	18	1.860	0	1.860	10 x 2 = 20	37.20	2.000	74.400
	E102	1.860	-	14	1.860	0	1.860	2 x 2 = 4	7.44	1.21	9.002
	E103	0.120 0.24 0.14 0.15	0.2	12	0.800	0	0.800	10 x 2 = 20	16.00	0.888	14.208
END BARREL KEY	H301	1.860	-	24	1.860	0	1.860	4 x 2 = 8	14.880	3.550	52.824
	H302	0.320 0.396 0.28 0.320	0.15	14	1.316	0	1.316	13 x 2 = 26	34.215	1.210	41.401
	H300 *WALL*	0.800	0.3	16	0.800	0	0.800	4 x 4 = 16	12.80	1.580	20.224
	H300 *BOT.SLAB*	0.800	0.15	16	0.800	0	0.800	13 x 2 = 26	20.80	1.580	32.864
	WALL *EXP. JT.*	0.800	0.3	16	0.800	0	0.800	4 x 2 = 8	6.40	1.580	10.112
	Top & Bot. *EXP. JT.*	0.800	0.15	16	0.800	0	0.800	26 x 1 = 26	20.80	1.580	32.864
										SUB TOTAL =	**315.415**

Station 0+350 skew 90 INLET

										BARREL WIDTH	APRON LENGTH
						NON-STANDARD					
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		X1	L1
1	1.50	0.95	0.26	0.22	0.22	0.00	26.565 °	-0.28648°		1.940	4.776

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	1.840	as	14	1.840	0.00	1.840	2 x 1 = 2	3.680	1.21	4.453
	H202	0.25 0.19 0.325 0.327	0.15	14	1.092	0	1.092	13 x 1 = 13	14.199	1.21	17.181
	A100	4.676	as	12	4.676	0	4.676	6 x 2 = 12	56.112	0.888	49.827
	F201	0.25 0.714 0.205 0.247	0.03 0.2	14	1.446	0	1.446	24 x 2 = 48	69.404	1.21	83.979
	F300 G300	4.676	0.15	12	4.676	0	4.676	13 x 2 = 26	121.576	0.888	107.959
	L4 F301	1.860 x=0.15	0.15	12	2.160	0	2.160	32 x 1 = 32	69.120	0.888	61.379
	L4 G301	1.860 x=0.15	0.15	12	2.160	0	2.160	32 x 1 = 32	69.120	0.888	61.379
									TOTAL FOR INLET APRON		**386.158**

Station 0+350 **skew 90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	NON-STANDARD SIDE SLOP	NON-STANDARD CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	0.95	0.26	0.22	0.22	0.00	26.56500°	0.28648°		1.940	4.776

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	4.740	as	12	4.740	0	4.740	2 x 2 = 4	18.961	0.888	16.837
	B101	0.15 ave =0.701 0.28 max =1.244 min =0.159	0.15	14	1.131	0	1.131	32 x 2 = 64	72.41	1.210	87.614
	C101	0.15 ave =0.701 0.14 max =1.244 min =0.159	0.15	12	0.991	0	0.991	32 x 2 = 64	63.45	0.888	56.342
	A101	ave =2.355 max =4.381 min =0.328	0.15	12	2.355	0	2.355	6 x 4 = 24	56.512	0.888	50.182
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.37	as	20	1.670	0	1.670	1 x 2 = 2	3.340	2.47	8.250
	B110	0.300 1.37	as	20	1.670	0	1.670	1 x 2 = 2	3.340	2.47	8.250
	B116	0.300 1.37	as	20	1.670	0	1.670	2 x 2 = 4	6.680	2.47	16.500
	C189	0.300 1.37	as	12	1.670	0	1.670	1 x 2 = 2	3.340	0.888	2.966
	C190	0.300 1.37	as	12	1.670	0	1.670	1 x 2 = 2	3.340	0.888	2.966
									TOTAL FOR INLET WING WALL		**262.666**

Station **0+350** **skew** **90** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	NON-STANDARD SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	0.95	0.26	0.22	0.22	0.00	26.565 °			1.940	4.776
TOE WALL (INLET)	A205	1.840	as	14	1.840	0	1.840	10 x 1 = 10	18.400	1.21	22.264
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	13 x 1 = 13	33.670	1.21	40.741
									TOTAL FOR INLET TOE WALL		**63.005**

Station **0+350** **skew** **90** **OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	0.95	0.26	0.22	0.22	0.00	26.5650°	-0.28648°		1.940	4.588

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	1.840	as	14	1.840	0.00	1.840	2 x 1 = 2	3.680	1.21	4.453
	H202	0.25 0.19 0.325 0.327	0.15	14	1.092	0	1.092	13 x 1 = 13	14.199	1.21	17.181
	A100	4.488	as	12	4.488	0	4.488	6 x 2 = 12	53.856	0.888	47.824
	F201	0.25 0.714 0.205 0.247	0.03 0.2	14	1.446	0	1.446	24 x 2 = 48	69.404	1.21	83.979
	F300 G300	4.488	0.15	12	4.488	0	4.488	13 x 2 = 26	116.688	0.888	103.619
	L4 F301	1.860 x=0.15	0.15	12	2.160	0	2.160	31 x 1 = 31	66.960	0.888	59.460
	L4 G301	1.860 x=0.15	0.15	12	2.160	0	2.160	31 x 1 = 31	66.960	0.888	59.460
									TOTAL FOR OUTLET APRON		**375.977**

Station 0+350 **skew 90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	NON-STANDARD SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	0.95	0.26	0.22	0.22	0.00	26.56500°	-0.28648°		1.940	4.588

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	4.558	as	12	4.558	0	4.558	2 x 2 = 4	18.231	0.888	16.189
	B101	0.15 ave =0.702 0.28 max =1.244 min =0.160	0.15	14	1.132	0	1.132	30 x 2 = 60	67.91	1.210	82.171
	C101	0.15 ave =0.702 0.14 max =1.244 min =0.160	0.15	12	0.992	0	0.992	30 x 2 = 60	59.51	0.888	52.845
	A101	ave =2.264 max =4.199 min =0.328	0.15	12	2.264	0	2.264	6 x 4 = 24	54.330	0.888	48.245
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.37	as	20	1.670	0	1.670	1 x 2 = 2	3.340	2.47	8.250
	B110	0.300 1.37	as	20	1.670	0	1.670	1 x 2 = 2	3.340	2.47	8.250
	B116	0.300 1.37	as	20	1.670	0	1.670	2 x 2 = 4	6.680	2.47	16.500
	C189	0.300 1.37	as	12	1.670	0	1.670	1 x 2 = 2	3.340	0.888	2.966
	C190	0.300 1.37	as	12	1.670	0	1.670	1 x 2 = 2	3.340	0.888	2.966
										TOTAL FOR OUTLET WING WALL	**251.140**

Station 0+350 **skew 90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	NON-STANDARD SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	0.95	0.26	0.22	0.22	0.00	26.565 °			1.940	4.588

TOE WALL (OUTLET)	A205	1.840	as	14	1.840	0	1.840	20 x 1 = 20	36.800	1.21	44.528
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	13 x 1 = 13	59.670	1.21	72.201
										TOTAL FOR OUTLET TOE WALL	**116.729**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 0+350 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	0.95	0.26	0.22	0.22	0.00	0.20	0.55	47.167	1.940	1.940

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	27.516	870.654
E103		14.208	
W.W.		828.930	
A	14	685.199	5,224.555
B		691.055	
F		530.004	
G		411.497	
LONG'L		2,295.652	
E102		9.002	
H302		41.401	
W.W.		560.745	
D	16	1,986.629	2,082.693
H300		53.088	
E.J		42.976	
E101	18	74.400	74.400
W.W.	20	65.998	65.998
	22	0.000	0.000
H301	24	52.824	52.824
	25	0.000	0.000
		TOTAL WEIGHT =	**8,371.125**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 0+350 **skew 90° Normal**

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	0.95	0.26	0.22	0.22	0.00	0.200	0.55	47.167	1.940	1.940

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	20.131
BOTTOM SLAB	Vol. = Length * X * T1	23.791
OUTER WALLS	Vol. = Length * H * 2W1	19.716
INNER WALLS	Vol. = Length * H * W2	0.000
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.039
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.175
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2	0.118
	TOTAL VOLUME =	**63.970**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 0+350 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNES S (T)	X	xs
1	1.50	0.95	0.26	0.22	0.22	0.00	4.776	4.588	0.250	1.940	1.940

X2	SLOPE
	4.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	2.316
APRON OUTLET	Vol. = Lo * X * T	2.225
TOE WALL INLET	Vol. = XS * T * (1-T)	0.364
TOE WALL OUTLET	Vol. = XS * T * (2-T)	0.849
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	#VALUE!
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	#VALUE!
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.000
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.000
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.387
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.369
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.000
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.000
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.097
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.097
	TOTAL VOLUME =	**#VALUE!**

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor Res. Engineer	STD-NORMAL	Quantity Surveyor Proj. Manager

Station 37 + 452.180

R. C. B. C.

RCBC	**1**	**1.50 x**	**1.00**
T1 =	0.26	W1 =	0.22
T2 =	0.22	W2 =	0.00
SSL =	2.000 =	2.3094	
SSR =	2.000 =	2.3094	

Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L. ELEV.= 2032.567
CULV. SLP = 0.04000

Skew = 60 ° Right
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

t =	0.630	xleft =	3.316
skew =	60	yleft =	0.829
slope =	0.25	xright =	2.032
rd. width =	14.300	yright =	0.508
half med=	2.000		

Station 37+452.180

		PGL	S.E.						
1	37462.350	2036.42	0.06	a	17.616	b	10.170	c	20.341
2	37+460.436	2036.327	0.06	a	14.300	b	8.256	c	16.512
3	37+453.335	2035.766		a	2.000	b	1.155	c	2.309
4	37+452.180	2035.674		a		b		c	
5	37+451.025	2035.583		a	2.000	b	1.155	c	2.309
6	37+443.924	2035.02	0.06	a	14.300	b	8.256	c	16.512
7	37+442.751	2034.869	0.06	a	16.332	b	9.429	c	18.859

Station 37 + 452.180 skew 60° Right

	S	H	T1	T2	W1	W2	TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1	No. of Pane	TOTAL
1	1.50	1.00	0.26	0.22	0.22	0.00	0.43	1.94	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	A	0.48 / 0.71	0.44	14	1.185	0.00	1.19	46 x 4 = 184	218.040	1.21	263.828
	B	1.86 / x=0.25	0.44	14	2.36	0	2.36	46 x 2 = 92	217.120	1.21	262.715
	D	1.86	0.36	14	1.86	0	1.86	56 x 2 = 112	208.320	1.21	252.067
	F	x=0.25 / 1.36	0.44	14	1.86	0	1.86	46 x 2 = 92	171.120	1.21	207.055
	G	x=0.25 / 1.36	0.44	14	1.61	0	1.61	46 x 2 = 92	148.120	1.21	179.225
	LONG'NAL 20.000	12 / 8.740 O.I.= 60 x Ø	VAR.	14	20.740	0	20.740	11+11+7*2 36	746.640	1.21	903.434
						STD-SKEW				SUB TOTAL =	2068.326

Station 37 + 452.180 skew 60 ° Right

TABLE 2

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL			X	BARREL LENGTH P2=P3		TOTAL
1	1.50	1.00	0.26	0.22	0.22			1.94	11.687		11.687

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2=P3 11.687 m.	A	0.48 / 0.71	0.44	14	1.185	0.00	1.19	27 x 8 = 216	255.96	1.21	309.712
	B	1.86 / x=0.25	0.44	14	2.36	0	2.36	27 x 4 = 108	254.88	1.21	308.405
	D	1.86	0.36	14	1.86	0	1.86	33 x 4 = 132	245.520	1.21	297.079
	F	x=0.25 / 1.36	0.44	14	1.86	0	1.86	27 x 4 = 108	200.88	1.21	243.065
	G	x=0.25 / 1.36	0.44	14	1.61	0	1.61	27 x 4 = 108	173.88	1.21	210.395
	P2 to P5 Top Slab max=13.510	12 / 0.559 min=11.608	VAR.	14	12.559	0	12.559	11*2 = 22	276.304	1.21	334.328
	P2 to P5 Bot. Slab max=13.510	12 / 0.559 min=11.608	VAR.	14	12.559	0	12.559	11*2 = 22	276.304	1.21	334.328
	W.W. Short NF L= 11.608	0 / 11.608	VAR.	14	11.608	0	11.608	4*2 = 8	92.865	1.21	112.366
	W.W. Short FF L= 11.689	0 / 11.689	VAR.	14	11.689	0	11.689	3 *2 = 6	70.134	1.21	84.862
	W.W. Long FF L= 13.430	12 / 1.430	VAR.	14	13.430	0	13.430	3 *2 = 6	80.578	1.21	97.499
	W.W. Long NF L= 13.510	12 / 1.510	VAR.	14	13.510	0	13.510	4*2 = 8	108.083	1.21	130.781
										SUB TOTAL =	**2462.818**

Station 37 + 452.180 skew 60 ° Right

								TABLE 2	BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL			X	P4=P5		TOTAL
1	1.50	1.00	0.26	0.22	0.22			1.94	1.120		1.120

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P4=P5 1.120 m.	A	0.48 0.705	0.44	14	1.185	0.00	1.19	1 x 4 = 4	4.740	1.21	5.735
	A	0.48 0.276	0.44	14	0.756	0	0.756	1 x 4 = 4	3.023	1.21	3.658
	B	0.657 x=0.25 max=1.038 min=0.276	0.44	14	0.907	0	0.907	2 x 4 = 8	7.255	1.21	8.778
	D	0.865 max=1.176 min=0.553	0.36	14	0.865	0	0.865	3 x 4 = 12	10.376	1.21	12.555
	F	x=0.25 1.36	0.44	14	1.86	0	1.86	3 x 2 = 6	11.160	1.21	13.504
	G	x=0.25 1.36	0.44	14	1.61	0	1.61	3 x 2 = 6	9.660	1.21	11.689
										SUB TOTAL =	**55.919**

Station 37 + 452.180 skew 60° Right

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIN	WC	TL		X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.231	0.600		1.940	2.240

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.400 0.14	0.3	12	1.281	0	1.281	7 x 4 = 28	35.857	0.888	31.841
	E101	2.148	-	18	2.148	0	2.148	10 x 2 = 20	42.95	2.000	85.910
	E102	2.148	-	14	2.148	0	2.148	2 x 2 = 4	8.59	1.21	10.395
	E103	0.174 0.24 0.14 0.15	0.2	12	0.854	0	0.854	10 x 2 = 20	17.09	0.888	15.172
END BARREL KEY	H301	2.148	-	24	2.148	0	2.148	4 x 2 = 8	17.182	3.550	60.996
	H302	0.370 0.396 0.28 0.370	0.15	14	1.415	0	1.415	13 x 2 = 26	36.790	1.210	44.515
	H300 *WALL*	0.924	0.3	16	0.924	0	0.924	4 x 4 = 16	14.78	1.580	23.353
	H300 *BOT.SLAB*	0.924	0.15	16	0.924	0	0.924	13 x 2 = 26	24.02	1.580	37.948
	WALL *EXP. JT.*	0.800	0.3	16	0.800	0	0.800	4 x 4 = 16	12.80	1.580	20.224
	Top & Bot. *EXP. JT.*	0.800	0.15	16	0.800	0	0.800	26 x 2 = 52	41.60	1.580	65.728
										SUB TOTAL =	**396.082**

Station 37 + 452.180 skew 60 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41300°	2.29060°		1.940	2.579

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	2.125	as	14	2.125	0.00	2.125	2 x 1 = 2	4.249	1.21	5.142
	H202	0.25 0.24 0.457 0.378	0.15	14	1.325	0	1.325	13 x 1 = 13	17.223	1.21	20.839
	A100	2.464	as	12	2.464	0	2.464	6 x 2 = 12	29.562	0.888	26.251
	F201	0.25 0.714 0.276 0.247	0.08 0.2	14	1.567	0	1.567	13 x 2 = 26	40.732	1.21	49.286
	F300 G300	2.464	0.15	12	2.464	0	2.464	13 x 2 = 26	64.052	0.888	56.878
	L3 F301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L3 G301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L4 F301	1.860 x=0.15	0.2	12	2.160	0	2.160	8 x 1 = 8	17.280	0.888	15.345
	L4 G301	1.860 x=0.15	0.2	12	2.160	0	2.160	8 x 1 = 8	17.280	0.888	15.345
									TOTAL FOR INLET APRON		**206.701**

Station 37 + 452.180 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41300°	-2.29060°		1.940	2.579

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	2.678	as	12	2.678	0	2.678	2 x 2 = 4	10.712	0.888	9.513
	B101	0.15 ave =0.730 0.28 max =1.302 min =0.158	0.15	14	1.160	0	1.160	17 x 2 = 34	39.44	1.210	47.724
	C101	0.15 ave =0.730 0.14 max =1.302 min =0.158	0.15	12	1.020	0	1.020	17 x 2 = 34	34.68	0.888	30.797
	A101	ave =1.284 max =2.174 min =0.395	0.15	12	1.284	0	1.284	7 x 4 = 28	35.965	0.888	31.937
	A300	0.229 0.06 0.140 0.5	0.15	12	0.929	0	0.929	8 x 2 = 16	14.858	0.888	13.194
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR INLET WING WALL		**173.261**

Station 37 + 452.180 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41 °	2.29060°		1.940	3.104

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	2.125	as	14	2.125	0.00	2.125	2 x 1 = 2	4.249	1.21	5.142
	H202	0.25 0.24 0.457 0.378	0.15	14	1.325	0	1.325	13 x 1 = 13	17.223	1.21	20.839
	A100	2.989	as	12	2.989	0	2.989	6 x 2 = 12	35.862	0.888	31.846
	F201	0.25 0.714 0.276 0.247	0.08 0.2	14	1.567	0	1.567	16 x 2 = 32	50.132	1.21	60.660
	F300 G300	2.989	0.15	12	2.989	0	2.989	13 x 2 = 26	77.702	0.888	68.999
	L3 F301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L3 G301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L4 F301	1.860 x=0.15	0.2	12	2.160	0	2.160	11 x 1 = 11	23.760	0.888	21.099
	L4 G301	1.860 x=0.15	0.2	12	2.160	0	2.160	11 x 1 = 11	23.760	0.888	21.099
									TOTAL FOR OUTLET APRON		**247.299**

Station 37 + 452.180 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.413 °			1.940	2.579
TOE WALL (INLET)	A205	2.125	as	14	2.125	0	2.125	10 x 1 = 10	21.246	1.21	25.708
	A203	0.173 0.774 0.800 0.196	0.15	14	2.743	0	2.743	15 x 1 = 15	41.147	1.21	49.788
									TOTAL FOR INLET TOE WALL		**75.496**

Station 37 + 452.180 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41300°	2.29060°		1.940	3.104

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	3.159	as	12	3.159	0	3.159	2 x 2 = 4	12.635	0.888	11.220
	B101	0.15 ave =0.726 0.28 max =1.302 min =0.151	0.15	14	1.156	0	1.156	21 x 2 = 42	48.57	1.210	58.770
	C101	0.15 ave =0.726 0.14 max =1.302 min =0.151	0.15	12	1.016	0	1.016	21 x 2 = 42	42.69	0.888	37.909
	A101	ave =1.514 max =2.633 min =0.395	0.15	12	1.514	0	1.514	7 x 4 = 28	42.390	0.888	37.642
	A300	0.229 0.06 0.140 0.5	0.15	12	0.929	0	0.929	8 x 2 = 16	14.858	0.888	13.194
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR OUTLET WING WALL		**198.831**

Station 37 + 452.180 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.413°			1.940	3.104

TOE WALL (OUTLET)	A205	2.125	as	14	2.125	0	2.125	20 x 1 = 20	42.493	1.21	51.416
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	15 x 1 = 15	71.147	1.21	86.088
									TOTAL FOR OUTLET TOE WALL		**137.505**

Station 970+773.582

R. C. B. C.

RCBC **1 - 1.50 x 1.00**

T1 = 0.26 W1 = 0.22
T2 = 0.22 W2 = 0.00
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2144.407
B.C. slope = -0.00400

Skew = 90 ° Normal
P.G.L. = 2146.369
SL = 0.018910 SR = 0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station 970+773.582 **skew 90° Normal**

	S	H	T1	T2	W1	W2	NON-STANDARD		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1	No. of Pane	TOTAL
1	1.50	1.00	0.26	0.22	0.22	0.00	0.50	1.94	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	1	1.52 1.38 1.52	0.15	20	4.42	0	4.42	134 x 2 268	1184.56	2.47	2925.863
	2	x=0.14 1.84	0.15	25	2.12	0	2.12	134 x 1 134	284.08	3.852	1094.276
	3	1.84 x=0.18	0.15	14	2.2	0	2.2	134 x 1 134	294.800	1.21	356.708
	4	x=0.25 1.38	0.15	12	1.88	0	1.88	134 x 2 268	503.84	0.888	447.410
	Top SLAB 5 20.000	12 8.620 O.L.=60*Ø	0.20	12	20.620	0	20.620	11 x 1 11	226.820	0.888	201.416
	TOP SLAB 6 20.000	12 8.860 O.L.=60*Ø	0.20	16	20.860	0	20.860	11 x 1 11	229.460	1.58	362.547
	EXT.WALL 5 20.000	12 8.620 O.L.=60*Ø	0.20	12	20.620	0	20.620	6 x 4 24	494.880	0.888	439.453
	BOT SLAB 5 20.000	12 8.620 O.L.=60*Ø	0.20	12	20.620	0	20.620	11 x 2 22	453.640	0.888	402.832
										SUB TOTAL =	**6230.506**

Station 970+773.582 skew 90 ° Normal

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL		NON-STANDARD	X	BARREL LENGTH P2		TOTAL
1	1.50	1.00	0.26	0.22	0.22			1.94	14.032		14.032

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 14.032 m.	1	1.52 1.38 1.52	0.15	20	4.42	0	4.42	94 x 2 188	830.96	2.47	2052.471
	2	x=0.14 1.84	0.15	25	2.12	0	2.12	94 x 1 94	199.28	3.852	767.627
	3	1.84 x=0.18	0.15	14	2.2	0	2.2	94 x 1 94	206.800	1.21	250.228
	4	x=0.25 1.38	0.15	12	1.88	0	1.88	94 x 2 188	353.44	0.888	313.855
	Top SLAB 5 14.032	12 2.652 O.L.=60*Ø	0.20	12	14.652	0	14.652	11 x 1 11	161.172	0.888	143.121
	TOP SLAB 6 14.032	12 2.892 O.L.=60*Ø	0.20	16	14.892	0	14.892	11 x 1 11	163.812	1.58	258.823
	EXT.WALL 5 14.032	12 2.652 O.L.=60*Ø	0.20	12	14.652	0	14.652	6 x 4 24	351.648	0.888	312.263
	BOT SLAB 5 14.032	12 2.652 O.L.=60*Ø	0.20	12	14.652	0	14.652	11 x 2 22	322.344	0.888	286.241
										SUB TOTAL =	**4384.629**

Station 970+773.582 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIN	WC	TL		X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.20	0.55		1.940	1.940

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.313 0.14	0.3	12	1.107	0	1.107	7 x 4 = 28	30.987	0.888	27.516
	E101	1.860	-	18	1.860	0	1.860	10 x 2 = 20	37.20	2.000	74.400
	E102	1.860	-	14	1.860	0	1.860	2 x 2 = 4	7.44	1.21	9.002
	E103	0.120 0.24 0.14 0.15	0.2	12	0.800	0	0.800	10 x 2 = 20	16.00	0.888	14.208
	H301	1.860	-	24	1.860	0	1.860	4 x 2 = 8	14.880	3.550	52.824
END BARREL KEY	H302	0.320 0.396 0.28 0.320	0.15	14	1.316	0	1.316	13 x 2 = 26	34.215	1.210	41.401
	H300 *WALL*	0.800	0.3	16	0.800	0	0.800	3 x 4 = 12	9.60	1.580	15.168
	H300 *BOT.SLAB*	0.800	0.15	16	0.800	0	0.800	13 x 2 = 26	20.80	1.580	32.864
	WALL *EXP. JT.*	0.800	0.3	16	0.800	0	0.800	3 x 4 = 12	9.60	1.580	15.168
	Top & Bot. *EXP. JT.*	0.800	0.15	16	0.800	0	0.800	26 x 2 = 52	41.60	1.580	65.728
										SUB TOTAL =	**348.279**

Station 970+773.582 skew 90 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.565 °	0.22918°		1.940	2.421

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	1.840	as	14	1.840	0.00	1.840	2 x 1 = 2	3.680	1.21	4.453
	H202	0.25 0.19 0.325 0.327	0.15	14	1.092	0	1.092	13 x 1 = 13	14.199	1.21	17.181
	A100	2.321	as	12	2.321	0	2.321	6 x 2 = 12	27.852	0.888	24.733
	F201	0.25 0.714 0.205 0.247	0.03 0.2	14	1.446	0	1.446	13 x 2 = 26	37.594	1.21	45.489
	F300 G300	2.321	0.15	12	2.321	0	2.321	13 x 2 = 26	60.346	0.888	53.587
	L4 F301	1.860 x=0.15	0.15	12	2.160	0	2.160	17 x 1 = 17	36.720	0.888	32.607
	L4 G301	1.860 x=0.15	0.15	12	2.160	0	2.160	17 x 1 = 17	36.720	0.888	32.607
									TOTAL FOR INLET APRON		**210.657**

Station 970+773.582 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.56500°	-0.22918°		1.940	2.421

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	2.537	as	12	2.537	0	2.537	2 x 2 = 4	10.148	0.888	9.011
	B101	0.15 ave = 0.727 0.28 max = 1.294 min = 0.159	0.15	14	1.157	0	1.157	16 x 2 = 32	37.017	1.210	44.791
	C101	0.15 ave = 0.727 0.14 max = 1.294 min = 0.159	0.15	12	1.017	0	1.017	16 x 2 = 32	32.544	0.888	28.899
	A101	ave = 1.180 2.032 0.328	0.15	12	1.180	0	1.180	7 x 4 = 28	33.038	0.888	29.338
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR INLET WING WALL		**164.894**

Station 970+773.582 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.565 °			1.940	2.421
TOE WALL (INLET)	A205	1.840	as	14	1.840	0	1.840	10 x 1 = 10	18.400	1.21	22.264
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	13 x 1 = 13	33.670	1.21	40.741
									TOTAL FOR INLET TOE WALL		**63.005**

Station 970+773.582 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.57 °	0.22918°		1.940	2.460

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	1.840	as	14	1.840	0.00	1.840	2 x 1 = 2	3.680	1.21	4.453
	H202	0.25 0.19 0.325 0.327	0.15	14	1.092	0	1.092	13 x 1 = 13	14.199	1.21	17.181
	A100	2.360	as	12	2.360	0	2.360	6 x 2 = 12	28.320	0.888	25.148
	F201	0.25 0.714 0.205 0.247	0.03 0.2	14	1.446	0	1.446	13 x 2 = 26	37.594	1.21	45.489
	F300 G300	2.360	0.15	12	2.360	0	2.360	13 x 2 = 26	61.360	0.888	54.488
	L4 F301	1.860 x=0.15	0.15	12	2.160	0	2.160	17 x 1 = 17	36.720	0.888	32.607
	L4 G301	1.860 x=0.15	0.15	12	2.160	0	2.160	17 x 1 = 17	36.720	0.888	32.607
									TOTAL FOR OUTLET APRON		**211.974**

Station 970+773.582 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.56500°	0.22918°		1.940	2.460

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	2.572	as	12	2.572	0	2.572	2 x 2 = 4	10.286	0.888	9.134
	B101	0.15 ave =0.726 0.28 max =1.294 min =0.159	0.15	14	1.156	0	1.156	16 x 2 = 32	37.01	1.210	44.777
	C101	0.15 ave =0.726 0.14 max =1.294 min =0.159	0.15	12	1.016	0	1.016	16 x 2 = 32	32.51	0.888	28.871
	A101	ave =1.197 max =2.066 min =0.328	0.15	12	1.197	0	1.197	7 x 4 = 28	33.515	0.888	29.761
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR OUTLET WING WALL		**165.398**

Station 970+773.582 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.565 °			1.940	2.460

TOE WALL (OUTLET)	A205	1.840	as	14	1.840	0	1.840	20 x 1 = 20	36.800	1.21	44.528
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	13 x 1 = 13	59.670	1.21	72.201
									TOTAL FOR OUTLET TOE WALL		**116.729**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 970+773.582 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.20	0.55	34.032	1.940	1.940

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
04	12	761.265	3,049.452
05		1,785.328	
S100		27.516	
E103		14.208	
W.W		461.135	
03	14	606.936	1,060.886
E102		9.002	
H302		41.401	
W.W		403.547	
06	16	621.370	750.298
H300		48.032	
E.J.		80.896	
E101	18	74.400	74.400
01	20	4,978.334	5,046.309
W.W		67.974	
	22	0.000	0.000
H301	24	52.824	52.824
02	25	1,861.903	1,861.903
		TOTAL WEIGHT =	**11,896.071**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 970+773.582 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.200	0.55	34.032	1.940	1.940

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	14.525
BOTTOM SLAB	Vol. = Length * X * T1	17.166
OUTER WALLS	Vol. = Length * H * 2W1	14.974
INNER WALLS	Vol. = Length * H * W2	0.000
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.039
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.175
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2	0.085
	TOTAL VOLUME =	**46.964**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 970+773.582 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	2.421	2.460	0.250	1.940	1.940

X2	SLOPE
0.2	2.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	1.174
APRON OUTLET	Vol. = Lo * X * T	1.193
TOE WALL INLET	Vol. = XS * T * (1-T)	0.364
TOE WALL OUTLET	Vol. = XS * T * (2-T)	0.849
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.589
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.598
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.000
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.000
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.166
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.169
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.000
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.000
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.097
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.097
	TOTAL VOLUME =	**5.296**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station 37 + 836.470

R. C. B. C.

RCBC	**1**	**1.50 x**	**1.00**
T1 =	0.26	W1 =	0.22
T2 =	0.22	W2 =	0.00
SSL =	2.000 =	2.3094	
SSR =	2.000 =	2.3094	
Inner Shoulder =	2.000		
Outer Shoulder =	3.000		
Shoulder Slope =	4.000		
C.L. ELEV.=	2024.589		
CULV. SLP =	0.04000		

Skew =	60 °	Left	
C.W. =	7.300		
H/MED. =	2.000		
Layer =	0.630		

t =	0.630	xleft =	2.921
skew =	60	yleft =	0.727
slope =	0.25	xright =	2.203
rd. width =	14.300	yright =	0.551
half med=	2.000		

Station 37+836.470

		PGL	S.E.						
1	37846.413	2026.675	0.03324079	a	17.221	b	9.943	c	19.885
2	37+844.726	2026.674	0.0343451	a	14.300	b	8.256	c	16.512
3	37+837.625	2026.676		a	2.000	b	1.155	c	2.309
4	37+836.470	2026.677		a		b		c	
5	37+835.315	2026.678		a	2.000	b	1.155	c	2.309
6	37+828.214	2026.689	0.036	a	14.300	b	8.256	c	16.512
7	37+826.942	2026.691	0.036	a	16.503	b	9.528	c	19.056

Station 37 + 836.470 skew 60° Left

CELL NO.	S SPAN	H HEIGHT	T1 BOT.SLAB	T2 TOP SLAB	W1 EXT.WALL	W2 INT. WALL	NON-STANDARD SLOPE	X	BARREL LENGTH P1	No. of Pane	TOTAL
1	1.50	1.00	0.26	0.22	0.22	0.00	0.43	1.94	20.000	1	20.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	1	1.52 / 1.38 / 1.52	0.15	20	4.42	0	4.42	134 x 2 268	1184.56	2.47	2925.863
	2	x=0.14 / 1.84	0.15	25	2.12	0	2.12	134 x 1 134	284.08	3.852	1094.276
	3	1.84 / x=0.18	0.15	14	2.2	0	2.2	134 x 1 134	294.800	1.21	356.708
	4	x=0.25 / 1.38	0.15	12	1.88	0	1.88	134 x 2 268	503.84	0.888	447.410
	Top SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	11 x 1 11	226.820	0.888	201.416
	TOP SLAB 6 20.000	12 / 8.860 / O.L.=60*Ø	0.20	16	20.860	0	20.860	11 x 1 11	229.460	1.580	362.547
	EXT.WALL 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	6 x 4 24	494.880	0.888	439.453
	BOT SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	11 x 2 22	453.640	0.888	402.832
										SUB TOTAL =	**6230.506**

Station **37 + 836.470** **skew** **60 °** **Left**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL		NON-STANDARD	X	BARREL LENGTH P2=P3		TOTAL
1	1.50	1.00	0.26	0.22	0.22			1.94	9.592		9.592

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2=P3 9.592 m.	1	1.52 1.38 1.52	0.15	20	4.42	0	4.42	64 x 4 256	1131.52	2.47	2794.854
	2	x=0.14 1.84	0.15	25	2.12	0	2.12	64 x 2 128	271.36	3.852	1045.279
	3	1.84 x=0.18	0.15	14	2.2	0	2.2	64 x 2 128	281.600	1.21	340.736
	4	x=0.25 1.38	0.15	12	1.88	0	1.88	64 x 4 256	481.28	0.888	427.377
	Top SLAB 5 max=10.575	0 10.044 min= 9.513	0.20	12	10.044	0	10.044	11 x 2 22	220.974	0.888	196.225
	TOP SLAB 6 max=10.575	0 10.044 min= 9.513	0.20	16	10.044	0	10.044	11 x 2 22	220.974	1.58	349.139
	EXT.WALL Short NF L= 9.513	0 9.513	0.20	12	9.513	0	9.513	6 x 2 12	114.157	0.888	101.372
	EXT.WALL Short FF L= 9.594	0 9.594	0.20	12	9.594	0	9.594	6 x 2 12	115.127	0.888	102.233
	EXT.WALL Long FF L= 10.495	0 10.495	0.20	12	10.495	0	10.495	6 x 2 12	125.935	0.888	111.830
	EXT.WALL Long NF L= 10.575	0 10.575	0.20	12	10.575	0	10.575	6 x 2 12	126.905	0.888	112.692
	BOT SLAB 5 max=10.604	0 10.044 min= 9.484	0.20	12	10.044	0	10.044	11 x 4 44	441.95	0.888	392.450
										SUB TOTAL =	**5974.186**

Station **37 + 836.470** **skew 60** **Left** **SKEW PORTION**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P4=P5		TOTAL
1	1.50	1.00	0.26	0.22	0.22	0.00		1.94	1.120		1.120

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P4=P5 1.120 m.	1-up	0.881 0.14 1.27 max = 1.530 min = 0.231	0.15	20	2.291	0	2.291	6 x 2 12	27.488	2.47	67.895
	1-down	1.31 0.881 max = 1.530 min = 0.231	0.15	20	2.191	0	2.191	6 x 2 12	26.288	2.47	64.931
	2var.	x=0.14 0.881 max = 1.530 min = 0.231	0.15	25	1.161	0	1.161	6 x 2 12	13.928	3.852	53.651
	3var.	1.140 0.28 0.25 0.370 0.18 0.396 max = 1.530 min = 0.751	0.15	14	2.616	0	2.616	4 x 2 8	20.928	1.21	25.322
	3	0.491 0.28 0.370 0.18 0.172	0.15	14	1.492	0	1.492	1 x 2 = 2	2.984	1.21	3.611
	3	0.231 0.28 0.231 0.18	0.15	14	0.922	0	0.922	1 x 2 = 2	1.845	1.21	2.232
	4	x=0.25 1.38	0.15	12	1.880	0	1.880	6 x 2 12	22.560	0.888	20.033
										SUB TOTAL =	**237.676**

Station **37 + 836.470** **skew** **60°** **Left**

NON-STANDARD

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS		X	xs
1	1.50	1.00	0.22	0.00	0.26	0.23	0.60	0.22		1.940	2.240

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	B01	2.125		18	2.125	0	2.125	10 x 2 = 20	42.493	2.000	84.986
	B02	0.485 / 0.14	0.2	12	1.449	0	1.449	10 x 2 = 20	28.981	0.888	25.735
	B03	0.097 / 0.14	0.2	10	0.674	0	0.674	10 x 4 = 40	26.952	0.614	16.549
	Y12	2.125		12	2.125	0	2.125	1 x 2 = 2	4.249	0.888	3.773
	Y12	0.12 / 0.24 / 0.14	0.2	12	0.495	0	0.495	10 x 2 = 20	9.909	0.888	8.800
	B04	2.125	-	14	2.125	0	2.125	6 x 2 = 12	25.496	1.210	30.850
END BARREL KEY	Y12	2.125		12	2.125	0	2.125	1 x 2 = 2	4.249	0.888	3.773
	H300 *WALL*	0.924	0.3	16	0.924	0	0.924	3 x 4 = 12	11.085	1.580	17.514
	H300 *BOT.SLAB*	0.924	0.15	16	0.924	0	0.924	13 x 2 = 26	24.018	1.580	37.948
	WALL *EXP. JT.*	0.800	0.3	16	0.800	0	0.800	3 x 4 = 12	9.60	1.580	15.168
	Top & Bot. *EXP. JT.*	0.800	0.15	16	0.800	0	0.800	26 x 2 = 52	41.60	1.580	65.728
										SUB TOTAL =	**310.825**

Station 37 + 836.470 skew 60 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP	BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41300°	2.29060°	1.940	2.579

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	2.125	as	14	2.125	0.00	2.125	2 x 1 = 2	4.249	1.21	5.142
	H202	0.25 0.24 0.457 0.378	0.15	14	1.325	0	1.325	13 x 1 = 13	17.223	1.21	20.839
	A100	2.464	as	12	2.464	0	2.464	6 x 2 = 12	29.562	0.888	26.251
	F201	0.25 0.714 0.276 0.247	0.08 0.2	14	1.567	0	1.567	13 x 2 = 26	40.732	1.21	49.286
	F300 G300	2.464	0.15	12	2.464	0	2.464	13 x 2 = 26	64.052	0.888	56.878
	L3 F301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L3 G301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L4 F301	1.860 x=0.15	0.2	12	2.160	0	2.160	8 x 1 = 8	17.280	0.888	15.345
	L4 G301	1.860 x=0.15	0.2	12	2.160	0	2.160	8 x 1 = 8	17.280	0.888	15.345
									TOTAL FOR INLET APRON		**206.701**

Station 37 + 836.470 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41300°	-2.29060°		1.940	2.579

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	2.678	as	12	2.678	0	2.678	2 x 2 = 4	10.712	0.888	9.513
	B101	0.15 ave =0.730 0.28 max =1.302 min =0.158	0.15	14	1.160	0	1.160	17 x 2 = 34	39.44	1.210	47.724
	C101	0.15 ave =0.730 0.14 max =1.302 min =0.158	0.15	12	1.020	0	1.020	17 x 2 = 34	34.68	0.888	30.797
	A101	ave =1.284 max =2.174 min =0.395	0.15	12	1.284	0	1.284	7 x 4 = 28	35.965	0.888	31.937
	A300	0.229 0.06 0.140 0.5	0.15	12	0.929	0	0.929	8 x 2 = 16	14.858	0.888	13.194
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
										TOTAL FOR INLET WING WALL	**173.261**

Station 37 + 836.470 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.413°			1.940	2.579

TOE WALL (INLET)	A205	2.125	as	14	2.125	0	2.125	10 x 1 = 10	21.246	1.21	25.708
	A203	0.173 0.774 0.800 0.196	0.15	14	2.743	0	2.743	15 x 1 = 15	41.147	1.21	49.788
										TOTAL FOR INLET TOE WALL	**75.496**

Station 37 + 836.470 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41 °	2.29060°		1.940	3.104

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	2.125	as	14	2.125	0.00	2.125	2 x 1 = 2	4.249	1.21	5.142
	H202	0.25 0.24 0.457 0.378	0.15	14	1.325	0	1.325	13 x 1 = 13	17.223	1.21	20.839
	A100	2.989	as	12	2.989	0	2.989	6 x 2 = 12	35.862	0.888	31.846
	F201	0.25 0.714 0.276 0.247	0.08 0.2	14	1.567	0	1.567	16 x 2 = 32	50.132	1.21	60.660
	F300 G300	2.989	0.15	12	2.989	0	2.989	13 x 2 = 26	77.702	0.888	68.999
	L3 F301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L3 G301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L4 F301	1.860 x=0.15	0.2	12	2.160	0	2.160	11 x 1 = 11	23.760	0.888	21.099
	L4 G301	1.860 x=0.15	0.2	12	2.160	0	2.160	11 x 1 = 11	23.760	0.888	21.099
									TOTAL FOR OUTLET APRON		**247.299**

Station 37 + 836.470 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41300°	2.29060°		1.940	3.104

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	3.159	as	12	3.159	0	3.159	2 x 2 = 4	12.635	0.888	11.220
	B101	0.15 ave =0.726 0.28 max =1.302 min =0.151	0.15	14	1.156	0	1.156	21 x 2 = 42	48.57	1.210	58.770
	C101	0.15 ave =0.726 0.14 max =1.302 min =0.151	0.15	12	1.016	0	1.016	21 x 2 = 42	42.69	0.888	37.909
	A101	ave =1.514 max =2.633 min =0.395	0.15	12	1.514	0	1.514	7 x 4 = 28	42.390	0.888	37.642
	A300	0.229 0.06 0.140 0.5	0.15	12	0.929	0	0.929	8 x 2 = 16	14.858	0.888	13.194
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR OUTLET WING WALL		**198.831**

Station 37 + 836.470 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.413°			1.940	3.104

TOE WALL (OUTLET)	A205	2.125	as	14	2.125	0	2.125	20 x 1 = 20	42.493	1.21	51.416
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	15 x 1 = 15	71.147	1.21	86.088
									TOTAL FOR OUTLET TOE WALL		**137.505**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 37 + 836.470 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.23	0.60	40.304	1.940	2.240

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
BO3	10	16.549	16.549
04	12	894.820	3,487.120
05		2,060.503	
B02		25.735	
Y12		16.346	
W.W.		489.715	
03	14	728.610	1,240.863
B04		30.850	
W.W.		481.404	
06	16	711.686	848.044
H300		55.462	
E.J.		80.896	
B01	18	84.986	84.986
01	20	5,853.544	5,921.519
W.W.		67.974	
	22	0.000	0.000
	24	0.000	0.000
02	25	2,193.206	2,193.206
		TOTAL WEIGHT =	**13,792.286**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37 + 836.470 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.231	0.60	40.304	1.940	2.240

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	17.202
BOTTOM SLAB	Vol. = Length * X * T1	20.329
OUTER WALLS	Vol. = Length * H * 2W1	17.734
INNER WALLS	Vol. = Length * H * W2	0.000
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.045
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.202
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2	0.101
	TOTAL VOLUME =	**55.613**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37 + 836.470 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNES S (T)	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	2.58	3.104	0.250	1.940	2.240

X2	SLOPE
0.2	2.309 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	1.251
APRON OUTLET	Vol. = Lo * X * T	1.505
TOE WALL INLET	Vol. = XS * T * (1-T)	0.420
TOE WALL OUTLET	Vol. = XS * T * (2-T)	0.980
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.628
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.755
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.000
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.000
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.180
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.230
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.000
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.000
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.112
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.112
	TOTAL VOLUME =	**6.173**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																					
	B	D	TOW	TIW	TBS	TTS	01		02		03		04		05		06		07		08		09		10		11	
							SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG
1	1000	1000	200	200	240	200	16	150	20	150	14	150	12	150	12	200	16	200										
2							16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150				
3							16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150
4							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
1	1500	1000	220	200	260	220	20	150	25	150	14	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	1500	1500	220	220	260	220	16	150	25	150	14	150	12	150	12	200	16	200										
2							16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
1	2000	1000	240	200	280	240	20	150	25	150	14	150	12	150	12	200	16	200										
2							20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
4							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
5							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
1	2000	1500	240	220	280	240	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
4							20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
5							25	150	25	150	14	150	14	150	12	200	16	200	25	150	20	150	20	150	20	150	12	150
1	2000	2000	240	240	280	240	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	16	150	16	150	12	200	16	200	25	150	16	150	16	150				
3							20	150	25	150	16	150	16	150	12	200	16	200	25	150	20	150	16	150	25	150	12	150
4							20	150	25	150	14	150	16	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150
5							25	150	25	150	14	150	16	150	12	200	16	200	25	150	20	150	20	150	20	150	12	150
1	2500	1000	280	200	320	280	20	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	2500	1500	280	220	320	280	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	2500	2000	280	240	320	280	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	16	150	14	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
5							20	150	20	150	16	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	2500	2500	280	260	320	280	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150				
3							20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150
4							20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	16	150	20	150	12	150
5							20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS | DIMENSIONS (mm) | REINFORCEMENT

B D TOW TIW TBS TTS 01 02 03 04 05 06 07 08 09 10 11

	B	D	TOW	TIW	TBS	TTS	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG
1	3000	1000	320	200	360	320	20	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	3000	1500	320	220	360	320	16	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	3000	2000	320	240	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							16	150	20	150	16	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3000	2500	320	260	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3000	3000	320	280	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
4							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
5							25	150	20	150	16	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
1	3500	1000	360	200	400	360	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3500	1500	360	220	400	360	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3500	2000	360	240	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
4							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
5							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
1	3500	2500	360	260	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
4							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
5							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
1	3500	3000	360	280	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	20	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150
4							20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150
5							20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
1	00	00	0	0	40	0	50	16	150	20	150	14	150	12	150	12	200	16	200											14 Y16	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150					14 Y16	Y12@200	2 Y10@200	6 Y14

3	10	10	2	2	2	2	7	16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150	14 Y16	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y16	Y12@200	2 Y10@200	6 Y14
1	1500	1000	220	200	260	220	850	20	150	25	150	14	150	12	150	12	200	16	200											14 Y18	Y12@200	2 Y10@200	6 Y14
2								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150					14 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
1	1500	1500	220	220	260	220	850	16	150	25	150	14	150	12	150	12	200	16	200											14 Y18	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					14 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
1	2000	1000	240	200	280	240	950	20	150	25	150	14	150	12	150	12	200	16	200											14 Y20	Y12@200	2 Y10@200	6 Y16
2								20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					14 Y20	Y12@200	2 Y10@200	6 Y16
3								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y14
1	2000	1500	240	220	280	240	950	16	150	25	150	16	150	12	150	12	200	16	200											14 Y20	Y12@200	2 Y10@200	6 Y16
2								20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150					14 Y20	Y12@200	2 Y10@200	6 Y16
3								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y16
4								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y16
1	2500	1000	280	200	320	280	950	20	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y16
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y16
1	2500	1500	280	220	320	280	950	20	150	25	150	16	150	12	150	12	200	16	200											14 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1000	320	200	360	320	950	20	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150					14 Y22	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
1	3000	1500	320	220	360	320	950	16	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
1	3500	1000	360	200	400	360	950	20	150	25	150	16	150	12	150	12	200	16	200											14 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150					14 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	3000	360	280	400	360	950	16	150	25	150	16	150	12	150	12	200	16	200											14 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150					14 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	20	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150	14 Y25	Y12@200	2 Y10@200	6 Y25
4								20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150	14 Y25	Y12@200	2 Y10@200	6 Y25

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)							REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
1	1000	1000	200	200	240	200	500	16	150	20	150	14	150	12	150	12	200	16	200											10 Y16	Y12@200	2 Y10@200	6 Y12
2								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150					10 Y16	Y12@200	2 Y10@200	6 Y12
3								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150	10 Y16	Y12@200	2 Y10@200	6 Y12
4								20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y16	Y12@200	2 Y10@200	6 Y12
1	1500	1000	220	200	260	220	600	20	150	25	150	14	150	12	150	12	200	16	200											10 Y18	Y12@200	2 Y10@200	6 Y14
2								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150					10 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
1	1500	1500	220	220	260	220	600	16	150	25	150	14	150	12	150	12	200	16	200											10 Y18	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					10 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
1	2000	1000	240	200	280	240	850	20	150	25	150	14	150	12	150	12	200	16	200											10 Y20	Y12@200	2 Y10@200	6 Y14
2								20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					10 Y20	Y12@200	2 Y10@200	6 Y14
3								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
1	2000	1500	240	220	280	240	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y20	Y12@200	2 Y10@200	6 Y14
2								20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150					10 Y20	Y12@200	2 Y10@200	6 Y14
3								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
1	2500	1000	280	200	320	280	850	20	150	20	150	14	150	12	150	12	200	14	200											10 Y22	Y12@200	2 Y10@200	6 Y16
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y16
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y16
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y16
1	2500	1500	280	220	320	280	850	20	150	25	150	16	150	12	150	12	200	16	200											10 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	2500	1500	280	220	320	280	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y22	Y12@200	2 Y10@200	6 Y20
2								20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1000	320	200	360	320	850	20	150	20	150	14	150	12	150	12	200	14	200											10 Y22	Y12@200	2 Y10@200	6 Y20
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150					10 Y22	Y12@200	2 Y10@200	6 Y20
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1500	320	220	360	320	850	16	150	20	150	14	150	12	150	12	200	14	200											10 Y25	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y20
1	3000	1500	320	220	360	320	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y25
2								16	150	20	150	16	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	1000	360	200	400	360	850	20	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	3000	360	280	400	360	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150	10 Y25	Y12@200	2 Y10@200	6 Y20

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
2	4000	4000	380	250	480	400	900	20	150	16	150	16	150	14	150	10	150	10	150	22	150	16	150	10	150					12 Y25	Y12@200	2 Y10@200	8 Y22
1	4500	2000	400	250	520	400	900																										
2								16	150	20	150	16	150	12	150	12	150	12	150	22	150	16	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	2500	400	250	520	400	900																										
2								16	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	3000	400	250	520	400	900																										
2								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	18	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	3500	400	250	520	400	900																										
2								18	150	20	150	18	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	18	150	12	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								20	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	4000	400	250	520	400	900																										
2								20	150	20	150	18	150	14	150	12	150	12	150	25	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								20	150	22	150	18	150	14	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								20	150	22	150	18	150	14	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	45000	400	250	520	400	900																										
2								22	150	20	150	18	150	16	150	12	150	12	150	25	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								22	150	22	150	18	150	16	150	12	150	12	150	22	150	18	150	12	150	20	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								22	150	22	150	18	150	16	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	

NON-STD

NOTES:

1. DESIGN WAS MADE ACCORDING TO M.O.C. MANUAL.
2. CONCRETE SPECIFIED CYLINDER STRENGTH 270 KGS/CM² AFTER 28 DAYS.
3. REINFORCEMENT STEEL YIELD STRENGTH 4200 KG/CM²
4. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE MENTIONED
5. CONCRETE COVER:
   - TOP SLAB
     - TOP REINFORCEMENT = 50mm
     - BOTTOM REINF. = 30mm.
   - BOTTOM SLAB & EXTERNAL WALLS
     - EXTERNAL REINF. = 50mm.
     - INTERNAL REINF. = 30mm.
   - INTERNAL WALLS REINF. = 30mm.
6. FOR R.C. BOX CULVERTS WITH 11 VENTS USE TWO SECTIONS 4 VENTS R.C. BOX CULVERTS PLUS ONE SECTION 3 VENTS R.C. BOX CULVERT WITH INTERMEDIATE EXPANSION JOINTS
7. FOR R.C. BOX CULVERTS WITH 15 & 20 VENTS USE 3 & 4 SECTIONS 5 VENTS R.C. BOX CULVERTS RESPECTIVELY WITH INTERMEDIATE EXPANSION JOINTS

TWO CELLS R.C. BOX CULVERT

ONE CELL R.C. BOX CULVERT

THREE CELLS R.C. BOX CULVERT

FOUR CELLS R.C. BOX CULVERT

FIVE CELLS R.C. BOX CULVERT

BOX CULVERT ENDut cursor here f

ONE CELL R.C. BOX CULVERT

FOUR CELLS R.C. BOX CULVERT

TWO CELLS R.C. BOX CULVERT

THREE CELLS R.C. BOX CULVERT

ut cursor here f

BOX CULVERT
END DETAIL PLANS
45º SKEW & 60º SKEW

WALL & BARREL ELEVATION

PART LONGITUDINAL SECTION

PART SEC. A – A

DETAIL " A "

EDGE CURB WIDTH	
EMBANKMENT SLOPE	WIDTH (WC)
6 : 1	0.60
4 : 1	0.40
3 : 1	0.30
2 : 1	0.20

RCBC 1 - CELL

CROSS - SECTIONAL DIMENSIONS & REINFORCEMENT

RCBC CELL DIMENSIONS						REINFORCEMENT																									
SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT END SECTION OF CULVERT						**TABLE 1 - 1.50m. FILL COVER OR LESS**																									
1.00	1.00	0.24	0.20	0.20	-	14	0.44	0.97	14	0.44	1.82	-	-	-	16	0.18	1.32	-	-	-	14	0.44	1.82	14	0.44	1.57	9	11	7	-	34
1.50	1.00	0.26	0.22	0.22	-	14	0.40	1.19	14	0.40	2.36	-	-	-	16	0.14	1.86	-	-	-	14	0.40	1.86	14	0.44	1.61	11	14	7	-	39
	1.50				-		0.44	1.34		0.44	2.36		-	-		0.14	1.86		-	-		0.44	2.36		0.44	2.11			9	-	43
2.00	1.00	0.28	0.24	0.24	-	14	0.28	1.40	14	0.42	2.90	-	-	-	16	0.14	2.4	-	-	-	14	0.42	1.90	14	0.44	1.65	13	18	7	-	45
	1.50				-		0.28	1.55		0.42	2.90		-	-		0.12	2.4		-	-		0.42	2.40		0.44	2.15			9	-	49
	2.00				-		0.28	1.70		0.42	2.90		-	-		0.12	2.4		-	-		0.42	2.90		0.44	2.65			11	-	53
2.50	1.00	0.32	0.28	0.28	-	14	0.22	1.66	14	0.44	3.48	-	-	-	16	0.14	2.98	-	-	-	14	0.44	1.98	14	0.44	1.73	15	19	7	-	48
	1.50				-		0.22	1.81		0.44	3.48		-	-		0.12	2.98		-	-		0.44	2.48		0.44	2.23			9	-	52
	2.00				-		0.22	1.96		0.44	3.48		-	-		0.12	2.98		-	-		0.44	2.98		0.44	2.73			11	-	56
	2.50				-		0.22	2.11		0.44	3.48		-	-		0.12	2.98		-	-		0.44	3.48		0.44	3.23			13	-	60
3.00	1.00	0.36	0.32	0.32	-	14	0.22	1.91	14	0.44	4.06	-	-	-	16	0.14	3.56	-	-	-	14	0.44	2.06	14	0.44	1.81	17	20	7	-	51
	1.50				-		0.22	2.06		0.44	4.06		-	-		0.14	3.56		-	-		0.44	2.56		0.44	2.31			9	-	55
	2.00				-		0.22	2.21		0.44	4.06		-	-		0.12	3.56		-	-		0.44	3.06		0.44	2.81			11	-	59
	2.50				-		0.22	2.36		0.44	4.06		-	-		0.12	3.56		-	-		0.44	3.56		0.44	3.31			13	-	63
	3.00				-		0.22	2.51		0.44	4.06		-	-		0.12	3.56		-	-		0.44	4.06		0.44	3.81			15	-	67
3.50	1.00	0.40	0.36	0.36	-	14	0.20	2.17	14	0.40	4.64	-	-	-	16	0.14	4.14	-	-	-	14	0.40	2.14	14	0.44	1.89	19	22	7	-	55
	1.50				-		0.20	2.32		0.40	4.64		-	-		0.14	4.14		-	-		0.40	2.64		0.44	2.39			9	-	59
	2.00				-		0.20	2.47		0.40	4.64		-	-		0.12	4.14		-	-		0.40	3.14		0.44	2.89			11	-	63
	2.50				-		0.20	2.62		0.40	4.64		-	-		0.12	4.14		-	-		0.40	3.64		0.44	3.39			13	-	67
	3.00				-		0.20	2.77		0.40	4.64		-	-		0.12	4.14		-	-		0.40	4.14		0.44	3.89			15	-	71

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT END SECTION OF CULVERT						**TABLE 2 - FILL COVER OVER 1.50m. TO 5.0m.**																									
1.00	1.00	0.24	0.20	0.20	-	14	0.44	0.97	14	0.44	1.82	-	-	-	14	0.44	1.32	-	-	-	14	0.44	1.82	14	0.44	1.57	9	9	7	-	32
1.50	1.00	0.26	0.22	0.22	-	14	0.44	1.19	14	0.44	2.36	-	-	-	14	0.36	1.86	-	-	-	14	0.44	1.86	14	0.44	1.61	11	11	7	-	36
	1.50				-		0.44	1.34		0.44	2.36		-	-		0.34	1.86		-	-		0.44	2.36		0.44	2.11			9	-	40
2.00	1.00	0.28	0.24	0.24	-	14	0.44	1.40	14	0.44	2.90	-	-	-	14	0.26	2.4	-	-	-	14	0.44	1.90	14	0.44	1.65	13	13	7	-	40
	1.50				-		0.44	1.55		0.44	2.90		-	-		0.24	2.4		-	-		0.44	2.40		0.44	2.15			9	-	44
	2.00				-		0.44	1.70		0.44	2.90		-	-		0.24	2.4		-	-		0.44	2.90		0.44	2.65			11	-	48
2.50	1.00	0.32	0.28	0.28	-	14	0.28	1.66	14	0.44	3.48	-	-	-	14	0.22	2.98	-	-	-	14	0.44	1.98	14	0.44	1.73	15	15	7	-	44
	1.50				-		0.28	1.81		0.44	3.48		-	-		0.2	2.98		-	-		0.44	2.48		0.44	2.23			9	-	48
	2.00				-		0.28	1.96		0.44	3.48		-	-		0.18	2.98		-	-		0.44	2.98		0.44	2.73			11	-	52
	2.50				-		0.28	2.11		0.44	3.48		-	-		0.18	2.98		-	-		0.44	3.48		0.44	3.23			13	-	56
3.00	1.00	0.36	0.32	0.32	-	14	0.22	1.91	14	0.44	4.06	-	-	-	14	0.18	3.56	-	-	-	14	0.44	2.06	14	0.44	1.81	17	17	7	-	48
	1.50				-		0.22	2.06		0.44	4.06		-	-		0.16	3.56		-	-		0.44	2.56		0.44	2.31			9	-	52
	2.00				-		0.22	2.21		0.44	4.06		-	-		0.16	3.56		-	-		0.44	3.06		0.44	2.81			11	-	56
	2.50				-		0.22	2.36		0.44	4.06		-	-		0.14	3.56		-	-		0.44	3.56		0.44	3.31			13	-	60
	3.00				-		0.22	2.51		0.44	4.06		-	-		0.14	3.56		-	-		0.44	4.06		0.44	3.81			15	-	64
3.50	1.00	0.40	0.36	0.36	-	14	0.18	2.17	14	0.36	4.64	-	-	-	14	0.14	4.14	-	-	-	14	0.36	2.14	14	0.44	1.89	19	19	7	-	52
	1.50				-		0.18	2.32		0.36	4.64		-	-		0.14	4.14		-	-		0.36	2.64		0.44	2.39			9	-	56
	2.00				-		0.18	2.47		0.36	4.64		-	-		0.14	4.14		-	-		0.36	3.14		0.44	2.89			11	-	60
	2.50				-		0.18	2.62		0.36	4.64		-	-		0.12	4.14		-	-		0.36	3.64		0.44	3.39			13	-	64
	3.00				-		0.18	2.77		0.36	4.64		-	-		0.12	4.14		-	-		0.36	4.14		0.44	3.89			15	-	68

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT FIRST INTERMEDIATE SECTION						**TABLE 3 - FILL COVER OVER 5.0m. TO 10.0m.**																									
1.00	1.00	0.28	0.24	0.24	-	14	0.44	1.05	14	0.44	1.90	-	-	-	14	0.36	1.40	-	-	-	14	0.44	1.90	14	0.44	1.65	9	9	7	-	32
1.50	1.00	0.30	0.26	0.26	-	14	0.44	1.27	14	0.44	2.44	-	-	-	16	0.30	1.94	-	-	-	14	0.44	1.94	14	0.44	1.69	11	11	7	-	36
	1.50				-		0.44	1.42		0.44	2.44		-	-		0.28	1.94		-	-		0.44	2.44		0.44	2.19			9	-	40
2.00	1.00	0.32	0.28	0.28	-	14	0.20	1.48	14	0.40	2.98	-	-	-	16	0.20	2.48	-	-	-	14	0.40	1.98	14	0.44	1.73	13	13	7	-	40
	1.50				-		0.20	1.63		0.40	2.98		-	-		0.18	2.48		-	-		0.40	2.48		0.44	2.23			9	-	44
	2.00				-		0.20	1.78		0.40	2.98		-	-		0.18	2.48		-	-		0.40	2.98		0.44	2.73			11	-	48
2.50	1.00	0.36	0.32	0.32	-	14	0.16	1.74	14	0.32	3.56	-	-	-	20	0.24	3.06	-	-	-	14	0.32	2.06	14	0.44	1.81	15	15	7	-	44
	1.50				-		0.16	1.89		0.32	3.56		-	-		0.24	3.06		-	-		0.32	2.56		0.44	2.31			9	-	48
	2.00				-		0.16	2.04		0.32	3.56		-	-		0.22	3.06		-	-		0.32	3.06		0.44	2.81			11	-	52
	2.50				-		0.16	2.19		0.32	3.56		-	-		0.22	3.06		-	-		0.32	3.56		0.44	3.31			13	-	56
3.00	1.00	0.42	0.38	0.38	-	16	0.16	2.03	14	0.32	4.18	-	-	-	20	0.22	3.68	-	-	-	14	0.32	2.18	14	0.44	1.93	17	17	7	-	48
	1.50				-		0.16	2.18		0.32	4.18		-	-		0.20	3.68		-	-		0.32	2.68		0.44	2.43			9	-	52
	2.00				-		0.16	2.33		0.32	4.18		-	-		0.20	3.68		-	-		0.32	3.18		0.44	2.93			11	-	56
	2.50				-		0.16	2.48		0.32	4.18		-	-		0.18	3.68		-	-		0.32	3.68		0.44	3.43			13	-	60
	3.00				-		0.16	2.63		0.32	4.18		-	-		0.18	3.68		-	-		0.32	4.18		0.44	3.93			15	-	64
3.50	1.00	0.48	0.44	0.44	-	20	0.18	2.33	14	0.36	4.80	-	-	-	24	0.28	4.30	-	-	-	14	0.36	2.30	14	0.44	2.05	19	19	7	-	52
	1.50				-		0.18	2.48		0.36	4.80		-	-		0.26	4.30		-	-		0.36	2.80		0.44	2.55			9	-	56
	2.00				-		0.18	2.63		0.36	4.80		-	-		0.24	4.30		-	-		0.36	3.30		0.44	3.05			11	-	60
	2.50				-		0.18	2.78		0.36	4.80		-	-		0.24	4.30		-	-		0.36	3.80		0.44	3.55			13	-	64
	3.00				-		0.18	2.93		0.36	4.80		-	-		0.22	4.30		-	-		0.36	4.30		0.44	4.05			15	-	68

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT SECOND INTERMEDIATE SECTION						**TABLE 4 - FILL COVER OVER 10.0m. TO 15.0m.**																									
1.00	1.00	0.32	0.28	0.28	-	14	0.44	1.13	14	0.44	1.98	-	-	-	14	0.30	1.48	-	-	-	14	0.44	1.98	14	0.44	1.73	9	9	7	-	32
1.50	1.00	0.34	0.30	0.30	-	14	0.22	1.35	14	0.44	2.52	-	-	-	16	0.40	2.02	-	-	-	14	0.44	2.02	14	0.44	1.77	11	11	7	-	36
	1.50				-		0.22	1.50		0.44	2.52		-	-		0.22	2.02		-	-		0.44	2.52		0.44	2.27			9	-	40
2.00	1.00	0.42	0.38	0.38	-	16	0.22	1.68	14	0.44	3.18	-	-	-	20	0.28	2.68	-	-	-	14	0.44	2.18	14	0.44	1.93	13	13	7	-	40
	1.50				-		0.22	1.83		0.44	3.18		-	-		0.26	2.68		-	-		0.44	2.68		0.44	2.43			9	-	44
	2.00				-		0.22	1.98		0.44	3.18		-	-		0.26	2.68		-	-		0.44	3.18		0.44	2.93			11	-	48
2.50	1.00	0.50	0.46	0.46	-	16	0.18	2.02	14	0.36	3.84	-	-	-	20	0.22	3.34	-	-	-	14	0.36	2.34	14	0.44	2.09	15	15	7	-	44
	1.50				-		0.18	2.17		0.36	3.84		-	-		0.22	3.34		-	-		0.36	2.84		0.44	2.59			9	-	48
	2.00				-		0.18	2.32		0.36	3.84		-	-		0.20	3.34		-	-		0.36	3.34		0.44	3.09			11	-	52
	2.50				-		0.18	2.47		0.36	3.84		-	-		0.20	3.34		-	-		0.36	3.84		0.44	3.59			13	-	56
3.00	1.00	0.58	0.54	0.54	-	20	0.20	2.35	14	0.40	4.50	-	-	-	24	0.28	4.00	-	-	-	14	0.40	2.50	14	0.44	2.25	17	17	7	-	48
	1.50				-		0.20	2.50		0.40	4.50		-	-		0.26	4.00		-	-		0.40	3.00		0.44	2.75			9	-	52
	2.00				-		0.20	2.65		0.40	4.50		-	-		0.26	4.00		-	-		0.40	3.50		0.44	3.25			11	-	56
	2.50				-		0.20	2.80		0.40	4.50		-	-		0.24	4.00		-	-		0.40	4.00		0.44	3.75			13	-	60
	3.00				-		0.20	2.95		0.40	4.50		-	-		0.24	4.00		-	-		0.40	4.50		0.44	4.25			15	-	64
3.50	1.00	0.68	0.64	0.64	-	20	0.18	2.73	14	0.36	5.20	-	-	-	24	0.26	4.70	-	-	-	14	0.36	2.70	14	0.44	2.45	19	19	7	-	52
	1.50				-		0.18	2.88		0.36	5.20		-	-		0.24	4.70		-	-		0.36	3.20		0.44	2.95			9	-	56
	2.00				-		0.18	3.03		0.36	5.20		-	-		0.22	4.70		-	-		0.36	3.70		0.44	3.45			11	-	60
	2.50				-		0.18	3.18		0.36	5.20		-	-		0.22	4.70		-	-		0.36	4.20		0.44	3.95			13	-	64
	3.00				-		0.18	3.33		0.36	5.20		-	-		0.22	4.70		-	-		0.36	4.70		0.44	4.45			15	-	68

RCBC 1 CELL

QUANTITIES PER METER OF CULVERT

RCBC		FOR TABLE 1 & 2			TABLE 3		TABLE 4	
S	H	C C.M.	STEEL KGS. TAB 1	STEEL KGS. TAB 2	C C.M.	STL KGS.	C C.M.	STL KGS.
1.00	1.00	1.016	104	85	1.250	90	1.496	94
1.50	1.00	1.371	138	101	1.651	111	1.944	124
	1.50	1.591	146	114	1.911	125	2.244	151
2.00	1.00	1.770	170	122	2.096	163	2.968	184
	1.50	2.010	192	135	2.376	182	3.348	202
	2.00	2.250	205	147	2.656	196	3.728	217
2.50	1.00	2.396	201	154	2.775	221	4.203	252
	1.50	2.676	226	170	3.095	237	4.663	268
	2.00	2.956	240	187	3.415	259	5.123	292
	2.50	3.236	254	200	3.735	275	5.583	308
3.00	1.00	3.115	228	192	3.768	280	5.650	330
	1.50	3.435	241	211	4.148	305	6.190	356
	2.00	3.755	268	225	4.528	322	6.730	374
	2.50	4.075	282	246	4.908	350	7.270	401
	3.00	4.395	296	260	5.288	367	7.810	419
3.50	1.00	3.927	264	249	4.910	359	7.590	408
	1.50	4.287	278	264	5.350	386	8.230	438
	2.00	4.647	308	279	5.790	415	8.870	469
	2.50	5.007	322	306	6.230	435	9.510	489
	3.00	5.367	336	321	6.670	465	10.150	508

CUTTING & BENDING DIAGRAMS

BAR SIZE	MIN. X
14Ø	0.25
16Ø	0.30
20Ø	0.35
24Ø	0.40
32Ø	0.60

BAR B

BAR D

BAR F

BAR G

NOTES FOR REINFORCEMENT BARS

1.) FABRICATION & TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE
2.) ALL DIMENSIONS ARE OUT TO OUT BARS
3.) NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR UNLESS OTHERWISE NOTED
4.) WEIGHT MEASUREMENT FOR ESTIMATING PURPOSES IS MADE TO THE NEAREST KILOGRAM PER METER OF CULVERT.

NOTE:

CONSTRUCTION JOINTS PERPENDICULAR TO THE LONGITUDINAL AXIS OF THE CULVERT SHALL BE PROVIDED TO A MAXIMUM OF 30m. INTERVALS

NEW LOADING - 3 AXLE 600KN TRUCK

CONSTRUCTION JOINT DETAIL

TYPICAL NORMAL SECTION OF CULVERT

NOTE:

ALL TRANSVERSE & OTHER LONGI. REINF. ARE THE SAME AS THOSE SHOWN IN TYPICAL NORMAL SECTION

TOP SLAB FOR TABLE 1

BAR SPACES FOR 14Ø LONGITUDINAL REINF.							
s	a	b	e	f	H	c	d
1.00	2	3	1	3	1.00	3	2
1.50	3	4	1	5	1.50	4	3
2.00	4	5	2	6	2.00	5	4
2.50	5	6	2	6	2.50	6	5
3.00	6	7	2	6	3.00	7	6
3.50	7	8	2	7	-	-	-

NOTE MIN. LAP SPLICES FOR LONGIT. BARS SHALL BE 0.5m.

SCHEDULE OF EDGE BEAM				
NO.	SPAN	DIMENSIONS	MAIN REINFORCEMENT	STIRRUPS
FOR ANGLE = 90º				
1	1.00	0.50 m x 0.20 m	8 - 16 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.55 m x 0.22 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.60 m x 0.24 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.60 m x 0.28 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.60 m x 0.32 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.60 m x 0.36 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
FOR ANGLE = 60º				
1	1.00	0.50 m x 0.20 m	8 - 18 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.60 m x 0.22 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.65 m x 0.22 m	10 - 20 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.65 m x 0.28 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.65 m x 0.32 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.65 m x 0.36 m	10 - 24 E 101 (TOP & BOTTOM)	- DO -
FOR ANGLE = 45º				
1	1.00	0.70 m x 0.20 m	10 - 18 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.85 m x 0.22 m	14 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.95 m x 0.24 m	14 - 20 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.95 m x 0.26 m	14 - 22 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.95 m x 0.32 m	14 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.95 m x 0.36 m	14 - 24 E 101 (TOP & BOTTOM)	- DO -

EDGE CURB WIDTH	
EMBANKMENT SLOPE	WIDTH (WC)
6 : 1	0.60
4 : 1	0.40
3 : 1	0.30
2 : 1	0.20

BAR Ø	UNIT WT.
10	0.617
12	0.888
14	1.21
16	1.58
18	2.00
20	2.47
22	2.98
24	3.55
25	3.85

DETAIL OF THE EXTENSION OF EXISTING R.C. BOX CULVERT

Please see notes here

TYPICAL LONGITUDINAL SECTION OF CULVERT

DETAIL A
EXPANSION JOINT DETAIL

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

SLOPE = 6 : 1

S	H	W1	W2	X2
1.00	0.70	0.20	0.20	0.20
1.50	0.70	0.22	0.20	0.20
2.00	0.70	0.24	0.20	0.20
2.50	0.70	0.28	0.20	0.24
3.00	0.70	0.32	0.20	0.24
3.50	0.70	0.36	0.20	0.24

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 2 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	6	8	12	16	18	22

Slope = 3 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Slope = 4 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Note:

Outer Wing Wall Key in Slope 2 : 1 = W1 + 0.10
But for 3 : 1 & 4 : 1 = W1 + 0.20

APRON BAR SCHEDULE

SLOPE = 2:1 & ANGLE = 45deg.

X1	No. of Cell maximum	L3	L4	Corner Space
4.78	1	4.780	5.515	0.80
8.64	2	8.640	1.655	
12.50	3	10.295	2.205	
16.36	4	10.295	6.065	

SLOPE = 2:1 & ANGLE = 60deg.

4.78	1	2.760	5.646	0.50
8.64	2	4.988	3.418	
12.50	3	7.217	1.189	
16.36	4	8.406	1.039	

SLOPE = 3:1 & ANGLE = 45deg.

4.78	1	4.780	10.663	0.80
8.64	2	8.640	6.803	
12.50	3	12.500	2.943	
16.36	4	15.443	0.917	

SLOPE = 3:1 & ANGLE = 60deg.

4.78	1	2.760	9.849	0.50
8.64	2	4.988	7.621	
12.50	3	7.217	5.392	
16.36	4	9.445	3.164	

SLOPE = 4:1 & ANGLE = 45deg.

4.78	1	4.780	15.811	0.80
8.64	2	8.640	11.951	
12.50	3	12.500	8.091	
16.36	4	16.360	4.231	

SLOPE = 4:1 & ANGLE = 60deg.

4.78	1	2.760	14.052	0.50
8.64	2	4.988	11.824	
12.50	3	7.217	9.595	
16.36	4	9.445	7.367	

WING WALL VERTICAL BAR SCHEDULE

SLOPE = 2:1 & ANGLE = 45deg.

OUTER WING WALL (B101- Far Face & C101 - Near Face)				INNER WING WALL (Both Sides)			
Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)	Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)
3.00	B101	4 @ 0.15	20	3.00	D101	24 @ 0.15	16
		20 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15	12				
2.50	B101	16 @ 0.15	18	2.50	D101	16 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				
2.00	B101	6 @ 0.15	18	2.00	D101	6 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				

SLOPE = 2:1 & ANGLE = 60deg.

3.00	B101	6 @ 0.15	20	3.00	D101	20 @ 0.15	16
		14 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15	12				
2.50	B101	12 @ 0.15	18	2.50	D101	12 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				
2.00	B101	7 @ 0.15	18	2.00	D101	7 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				

SLOPE = 2:1 & ANGLE = 90deg.

3.00	B101	6 @ 0.15	20	3.00	D101	18 @ 0.15	16
		12 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15	12				
2.50	B101	12 @ 0.15	18	2.50	D101	12 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				
2.00	B101	4 @ 0.15	18	2.00	D101	4 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				

FOR NEAR FACE **C101** ,SPACING IS **0.15mm**. & BAR SIZE IS **12mmØ** (CONSTANT TO ALL SKEW & HEIGHT)

FOR HORIZONTAL BARS **A101**, SPACING IS **0.15mm** & BAR SIZE IS **12mmØ** (CONSTANT TO ALL SKEW & HEIGHT)

WING WALL VERTICAL BAR SCHEDULE

SLOPE = 3:1 & ANGLE = 45deg.

OUTER WING WALL (B101- Far Face & C101 - Near Face)				INNER WING WALL (Both Sides)			
Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)	Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)
3.00	B101	6 @ 0.15	20	3.00	D101	27 @ 0.15	16
		21 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15	12				
2.50	B101	17 @ 0.15	18	2.50	D101	17 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				
2.00	B101	7 @ 0.15	18	2.00	D101	7 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				

SLOPE = 3:1 & ANGLE = 60deg.

3.00	B101	3 @ 0.12		3.00	D101	3 @ 0.12	
		17 @ 0.15	20			29 @ 0.15	16
		12 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15	12				
2.50	B101	7 @ 0.15	20	2.50	D101	19 @ 0.15	16
		12 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15	12				
2.00	B101	7 @ 0.15	18	2.00	D101	7 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				

SLOPE = 3:1 & ANGLE = 90deg.

3.00	B101	23 @ 0.15	20	3.00	D101	37 @ 0.15	16
		20 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15	12				
2.50	B101	9 @ 0.15	20	2.50	D101	23 @ 0.15	16
		20 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15	12				
2.00	B101	14 @ 0.15	18	2.00	D101	8 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15	12				

FOR NEAR FACE **C101** ,SPACING IS **0.15mm**. & BAR SIZE IS **12mmØ** (CONSTANT TO ALL SKEW & HEIGHT)

FOR HORIZONTAL BARS **A101**, SPACING IS **0.15mm** & BAR SIZE IS **12mmØ** (CONSTANT TO ALL SKEW & HEIGHT)

WING WALL VERTICAL BAR SCHEDULE

SLOPE = 4:1 & ANGLE = 45deg.

OUTER WING WALL (B101- Far Face & C101 - Near Face)				INNER WING WALL (Both Sides)			
Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)	Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)
3.00	B101	14 @ 0.15	20	3.00	D101	50 @ 0.15	16
		22 @ 0.15	18			varies@0.15	14
		15 @ 0.15	18				
		varies@0.15	14				
	C101	varies@0.15					
2.50	B101	17 @ 0.15	18	2.50	D101	31 @ 0.15	16
		15 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15					
2.00	B101	13 @ 0.15	18	2.00	D101	12 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15					

SLOPE = 3:1 & ANGLE = 60deg.

3.00	B101	11 @ 0.15	20	3.00	D101	40 @ 0.15	16
		14 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15					
2.50	B101	10 @ 0.15	18	2.50	D101	25 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15					
2.00	B101			2.00	D101	10 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15					

SLOPE = 3:1 & ANGLE = 90deg.

3.00	B101	8 @ 0.15	20	3.00	D101	34 @ 0.15	16
		12 @ 0.15	18			varies@0.15	14
		varies@0.15	14				
	C101	varies@0.15					
2.50	B101	8 @ 0.15	18	2.50	D101	22 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15					
2.00	B101			2.00	D101	8 @ 0.15	16
		varies@0.15	14			varies@0.15	14
	C101	varies@0.15					

FOR NEAR FACE **C101** ,SPACING IS **0.15mm**. & BAR SIZE IS **12mmØ** (CONSTANT TO ALL SKEW & HEIGHT)

FOR HORIZONTAL BARS **A101**, SPACING IS **0.15mm** & BAR SIZE IS **12mmØ** (CONSTANT TO ALL SKEW & HEIGHT)

Station **33+550.793**

RCBC **2 - 1.50 x 1.00**

R. C. B. C.

T1 = 0.26 W1 = 0.22
T2 = 0.22 W2 = 0.20
SSL = 3.0000 SSR = 3.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2093.500
B.C. slope = 0.00400

Skew = 90 ° Normal
P.G.L. = 2096.176
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station **33+550.793** **skew** **90°** **Normal**

	S	H	T1	T2	W1	W2	TABLE 1		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1	No. of Pane	TOTAL
2	1.50	1.00	0.26	0.22	0.22	0.20	0.33	3.64	20.000	1	20.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1, P1 20.000 m.	A	0.48 / 0.705	0.4	14	1.185	0.00	1.185	51 x 4 = 204	241.740	1.21	292.505
	B	2.405 / x=0.25	0.4	14	2.655	0	2.655	51 x 4 = 204	541.620	1.21	655.360
	D	3.560	0.22	20	3.56	0	3.56	92 x 2 = 184	655.040	2.47	1617.949
	F	x=0.25 / 1.36	0.4	14	1.86	0	1.86	51 x 2 = 102	189.720	1.21	229.561
	G	x=0.25 / 1.36	0.44	14	1.61	0	1.61	46 x 3 = 138	222.180	1.21	268.838
	LONG'NAL 20.000	12 / 8.740 / .l. = 60*dia.	VAR.	14	20.740	0	20.740	19+25+7*2+3= 61	1265.140	1.21	1530.819
										SUB TOTAL =	4595.033

Station 33+550.793 skew 90 Normal

							TABLE 1		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P2		TOTAL
2	1.50	1.00	0.26	0.22	0.22	0.20	0.32139	3.64	17.579		17.579

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 17.579 m.	A	0.48 / 0.705	0.4	14	1.185	0.00	1.185	45 x 8 = 360	426.600	1.21	516.186
	B	2.405 / x=0.25	0.4	14	2.655	0	2.655	45 x 8 = 360	955.800	1.21	1156.518
	D	3.56	0.22	20	3.56	0	3.56	81 x 4 = 324	1153.440	2.47	2848.997
	F	x=0.25 / 1.36	0.4	14	1.86	0	1.86	45 x 4 = 180	334.800	1.21	405.108
	G	x=0.25 / 1.36	0.44	14	1.61	0	1.61	41 x 6 = 246	396.060	1.21	479.233
	LONG'NAL 17.579	12 / 6.319	VAR.	14	18.319	0	18.319	(19+25+7*2+3)*2= 122	2234.918	1.21	2704.251
										SUB TOTAL =	**8110.292**

Station **33+550.793** **skew** **90** **Normal**

TABLE 1

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS		X	xs
2	1.50	1.00	0.22	0.20	0.26	0.200	0.550	0.22		3.640	3.640

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.313 0.14	0.3	12	1.107	0	1.107	13 x 4 = 52	57.547	0.888	51.101
	E101	3.560	-	18	3.560	0	3.560	10 x 2 = 20	71.20	2.000	142.400
	E102	3.560	-	14	3.560	0	3.560	2 x 2 = 4	14.24	1.21	17.230
	E103	0.120 0.24 0.14 0.15	0.2	12	0.800	0	0.800	19 x 2 = 38	30.40	0.888	26.995
	H301	3.560	-	24	3.560	0	3.560	4 x 2 = 8	28.480	3.550	101.104
	H302	0.320 0.325 0.23 0.320	0.15	14	1.195	0	1.195	25 x 2 = 50	59.763	1.210	72.314
	H300 *WALL*	0.800 dowel	0.3	16	0.800	0	0.800	3 x 6 = 18	14.40	1.580	22.752
	H300 *BOT.SLAB*	0.800 dowel	0.15	16	0.800	0	0.800	25 x 2 = 50	40.00	1.580	63.200
	WALL *EXP. JT.*	0.800 dowel	0.3	16	0.800	0	0.800	3 x 6 = 18	14.40	1.580	22.752
	Top & Bot. *EXP. JT.*	0.800 dowel	0.15	16	0.800	0	0.800	50 x 2 = 100	80.00	1.580	126.400
										SUB TOTAL =	**646.249**

Station **33+550.793** **skew** **90 °** **INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.43500°	0.22918°		3.640	3.617

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	3.540	as	14	3.540	0.00	3.540	2 x 1 = 2	7.080	1.21	8.567
	H202	0.25 0.24 0.396 0.327	0.15	14	1.213	0	1.213	25 x 1 = 25	30.324	1.21	36.693
	A100	3.517	as	12	3.517	0	3.517	6 x 3 = 18	63.306	0.888	56.216
	F201	0.25 0.714 0.276 0.347	0.08 0.2	14	1.667	0	1.667	19 x 2 = 38	63.332	1.21	76.632
	F202	0.25 0.25 0.276 0.334 0.276	0.2	14	1.386	0	1.386	19 x 1 = 19	26.325	1.21	31.854
	F300 G300	3.517	0.30	12	3.517	0	3.517	14 x 2 = 28	98.476	0.888	87.447
	L4 F301	3.560 x=0.15	0.2	12	3.860	0	3.860	19 x 1 = 19	73.340	0.888	65.126
	L4 G301	3.560 x=0.15	0.2	12	3.860	0	3.860	19 x 1 = 19	73.340	0.888	65.126
									TOTAL FOR INLET APRON		**427.659**

Station 33+550.793 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.43500°	-0.22918°		3.640	3.617

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	3.640	as	12	3.640	0	3.640	2 x 3 = 6	21.841	0.888	19.395
	B101	0.15 ave =0.729 0.38 max =1.311 min =0.148	0.15	14	1.259	0	1.259	24 x 2 = 48	60.44	1.210	73.131
	C101	0.15 ave =0.729 0.14 max =1.311 min =0.148	0.15	12	1.019	0	1.019	24 x 2 = 48	48.92	0.888	43.440
	D101	0.15 ave =0.729 0.26 max =1.311 min =0.148	0.15	14	1.139	0	1.139	24 x 2 = 48	54.68	1.210	66.162
	A101	ave =1.588 max =3.084 min =0.092	0.15	12	1.588	0	1.588	8 x 6 = 48	76.230	0.888	67.692
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	D135	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	D136	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	7 x 1 = 7	5.040	0.888	4.476
									TOTAL FOR INLET WING WALL		**338.021**

Station 33+550.793 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.435°			3.640	3.617

TOE WALL (INLET)	A205	3.540	as	14	3.540	0	3.540	10 x 1 = 10	35.400	1.21	42.834
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	25 x 1 = 25	64.750	1.21	78.348
									TOTAL FOR INLET TOE WALL		**121.182**

Station **33+550.793** **skew** **90 °** **OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP	BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.43500°	0.22918°	3.640	3.704

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	3.540	as	14	3.540	0.00	3.540	2 x 1 = 2	7.080	1.21	8.567
	H202	0.25 0.24 0.396 0.327	0.15	14	1.213	0	1.213	25 x 1 = 25	30.324	1.21	36.693
	A100	3.604	as	12	3.604	0	3.604	6 x 3 = 18	64.872	0.888	57.606
	F201	0.25 0.714 0.276 0.347	0.08 0.2	14	1.667	0	1.667	19 x 2 = 38	63.332	1.21	76.632
	F202	0.25 0.25 0.276 0.334 0.276	0.2	14	1.386	0	1.386	19 x 1 = 19	26.325	1.21	31.854
	F300 G300	3.604	0.30	12	3.604	0	3.604	14 x 2 = 28	100.912	0.888	89.610
	L4 F301	3.560 x=0.15	0.2	12	3.860	0	3.860	19 x 1 = 19	73.340	0.888	65.126
	L4 G301	3.560 x=0.15	0.2	12	3.860	0	3.860	19 x 1 = 19	73.340	0.888	65.126
									TOTAL FOR OUTLET APRON		**431.213**

Station 33+550.793 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.43500°	0.22918°		3.640	3.704

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	3.723	as	12	3.723	0	3.723	2 x 3 = 6	22.336	0.888	19.834
	B101	0.15 0.38 ave =0.729 max =1.311 min =0.147	0.15	14	1.259	0	1.259	25 x 2 = 50	62.94	1.210	76.157
	C101	0.15 0.14 ave =0.729 max =1.311 min =0.147	0.15	12	1.019	0	1.019	25 x 2 = 50	50.94	0.888	45.234
	D101	0.15 0.26 ave =0.729 max =1.311 min =0.147	0.15	14	1.139	0	1.139	25 x 2 = 50	56.94	1.210	68.897
	A101	ave =1.626 max =3.160 min =0.092	0.15	12	1.626	0	1.626	8 x 6 = 48	78.054	0.888	69.312
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	D135	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	D136	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	7 x 1 = 7	5.040	0.888	4.476
									TOTAL FOR OUTLET WING WALL		**347.635**

Station 33+550.793 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.435°			3.640	3.704
TOE WALL (OUTLET)	A205	3.540	as	14	3.540	0	3.540	20 x 1 = 20	70.800	1.21	85.668
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	25 x 1 = 25	114.750	1.21	138.848
									TOTAL FOR OUTLET TOE WALL		**224.516**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 33+550.793 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	0.20	0.55	37.579	3.640	3.640

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	51.101	941.073
E103		26.995	
W.W		862.976	
A	14	808.691	9,265.457
B		1,811.878	
F		634.669	
G		748.070	
LONG'L		4,235.070	
E102		17.230	
H302		72.314	
W.W		937.533	
H300		85.952	
E.J	16	149.152	256.845
W.W		21.741	
E101	18	142.400	142.400
D	20	4,466.946	4,534.920
W.W		67.974	
	22	0.000	0.000
H301	24	101.104	101.104
	25	0.000	0.000
		TOTAL WEIGHT =	**15,241.798**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 33+550.793 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	0.200	0.55	37.579	3.640	3.640

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	30.093
BOTTOM SLAB	Vol. = Length * X * T1	35.565
OUTER WALLS	Vol. = Length * H * 2W1	16.535
INNER WALLS	Vol. = Length * H * W2	7.516
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.073
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.328
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.188
	TOTAL VOLUME =	**90.298**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 33+550.793 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNES S (T)	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	3.617	3.704	0.250	3.640	3.640

X2	SLOPE
0.2	3.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	3.291
APRON OUTLET	Vol. = Lo * X * T	3.371
TOE WALL INLET	Vol. = XS * T * (1-T)	0.683
TOE WALL OUTLET	Vol. = XS * T * (2-T)	1.593
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.881
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.902
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.441
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.452
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.278
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.286
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.148
KEY BLOCKS INNER W.W. OUTLET	ol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.152
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.182
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.182
	TOTAL VOLUME =	**12.842**

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station 0 + 590.000

R. C. B. C.

RCBC	**2**	**2.00 x**	**1.50**
T1 =	0.32	W1 =	0.28
T2 =	0.28	W2 =	0.26
SSL =	2.000 =	2.3094	
SSR =	2.000 =	2.3094	
Inner Shoulder =	0.000		
Outer Shoulder =	3.000		
Shoulder Slope =	4.000		
C.L. ELEV.=	167.656		
CULV. SLP =	-0.01930		

Skew =	60 °	Left	
C.W. =	7.300		
H/MED. =	2.500		
Layer =	0.850		

t =	0.850	xleft =	3.617
skew =	60	yleft =	0.904
slope =	0.25	xright =	3.617
rd. width =	12.800	yright =	0.904
half med=	2.500		

Station 0+590.000

		PGL	S.E.						
1	599.478	178.368	0.015	a	16.417	b	9.478	c	18.957
2	0+597.390	178.343	0.015	a	12.800	b	7.390	c	14.780
3	0+591.443	178.28		a	2.500	b	1.443	c	2.887
4	0+590.000	178.264		a		b		c	
5	0+588.557	178.247		a	2.500	b	1.443	c	2.887
6	0+582.610	178.176	-0.015	a	12.800	b	7.390	c	14.780
7	0+580.522	178.156	-0.015	a	16.417	b	9.478	c	18.957
			0.000		0.000				

Station 0 + 590.000 skew 60 ° Left

	S	H	T1	T2	W1	W2	TABLE 3		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1	No. of Pane	TOTAL
2	2.00	1.50	0.32	0.28	0.28	0.26	0.43301	4.82	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	A	0.69 / 0.940	0.4	14	1.630	0.00	1.630	51 x 4 = 204	332.520	1.21	402.349
	B	3.200 / x=0.25	0.4	14	3.450	0	3.45	51 x 4 = 204	703.800	1.21	851.598
	D	4.740	0.22	20	4.74	0	4.74	92 x 2 = 184	872.160	2.47	2154.235
	F	x=0.25 / 1.98	0.4	14	2.48	0	2.48	51 x 2 = 102	252.960	1.21	306.082
	G	x=0.25 / 1.98	0.44	14	2.23	0	2.23	46 x 3 = 138	307.740	1.21	372.365
	LONG'NAL 20.000	12 / 8.740 / p.l. = 60*dia.	VAR.	14	20.740	0	20.740	19+25+7*2+3= 61	1265.140	1.21	1530.819
										SUB TOTAL =	**5617.449**

Station 0 + 590.000 **skew** 60 ° **Left**

							TABLE 3		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P2 & P3		TOTAL
2	2.00	1.50	0.32	0.28	0.28	0.26	0.43301	4.82	25.565		25.565

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 & P3 25.565 m.	A	0.69 0.940	0.4	14	1.630	0.00	1.630	65 x 8 = 520	847.600	1.21	1025.596
	B	3.200 x=0.25	0.4	14	3.450	0	3.45	65 x 8 = 520	1794.000	1.21	2170.740
	D	4.74	0.22	20	4.74	0	4.74	117 x 4 = 468	2218.320	2.47	5479.250
	F	x=0.25 1.98	0.4	14	2.48	0	2.48	65 x 4 = 260	644.800	1.21	780.208
	G	x=0.25 1.98	0.44	14	2.23	0	2.23	59 x 6 = 354	789.420	1.21	955.198
	P2 to P7 Top Slab max=29.891	24 4.529 min=27.166	VAR.	14	28.529	0	28.529	25*2 = 50	1426.438	1.21	1725.990
	P2 to P7 Bot. Slab max=29.891	24 4.529 min=27.166	VAR.	14	28.529	0	28.529	19*2 = 38	1084.093	1.21	1311.753
	W.W. Short NF L= 27.166	24 3.166	VAR.	14	27.166	0	27.166	4*2 = 8	217.330	1.21	262.969
	W.W. Short FF L= 27.282	24 3.282	VAR.	14	27.282	0	27.282	3 *2 = 6	163.690	1.21	198.065
	W.W. Long FF L= 29.776	24 5.776	VAR.	14	29.776	0	29.776	3 *2 = 6	178.655	1.21	216.173
	W.W. Long NF L= 29.891	24 5.891	VAR.	14	29.891	0	29.891	4*2 = 8	239.130	1.21	289.348
	W.W. Inner L= 28.529	24 4.529	VAR.	14	28.529	0	28.529	3*2 = 6	171.173	1.21	207.119
										SUB TOTAL =	**14622.409**

Station **0 + 590.000** **skew** **60** **Left**

TABLE 3

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL		X	BARREL LENGTH P4 = P6		TOTAL
2	2.00	1.50	0.32	0.28	0.28	0.26		4.82	1.391		1.391

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P4 = P6 1.391 m.	A	0.69 0.940	0.4	14	1.630	0.00	1.63	3 x 4 = 12	19.56	1.21	23.668
	B	3.200 x=0.25	0.4	14	3.450	0	3.45	3 x 4 = 12	41.4	1.21	50.094
	D	3.334 max= 4.299 min.= 2.370	0.22	20	3.334	0	3.334	6 x 4 = 24	80.027	2.47	197.668
	F	x=0.25 1.98	0.4	14	2.48	0	2.48	3 x 2 = 6	14.880	1.21	18.005
	G	x=0.25 1.98	0.44	14	2.23	0	2.23	3 x 4 = 12	26.760	1.21	32.380
										SUB TOTAL =	**321.814**

Station **0 + 590.000** **skew** **60** **Left**

							TABLE 3		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL		X	P5 = P7		TOTAL
2	2.00	1.50	0.32	0.28	0.28	0.26		4.82	1.391		1.391

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 4 - 4 P5 = P7 1.391 m.	A	0.69 / 0.940	0.4	14	1.630	0.00	1.630	1 x 4 = 4	6.52	1.21	7.889
	A	0.69 / 0.884	0.4	14	1.574	0.00	1.574	1 x 4 = 4	6.30	1.21	7.620
	B	1.231 / x=0.25 max =1.577 min.=0.884	0.4	14	1.481	0	1.481	2 x 4 = 8	11.846	1.21	14.334
	D	ave = 0.936 max =1.889 min.=0.016	0.22	20	0.936	0	0.936	6 x 4 = 24	22.472	2.47	55.505
	F	x=0.25 / 1.98	0.4	14	2.48	0	2.48	4 x 2 = 8	19.840	1.21	24.006
	G	x=0.25 / 1.98	0.44	14	2.23	0	2.23	3 x 3 = 9	20.070	1.21	24.285
										SUB TOTAL =	**133.639**

Station **0 + 590.000** **skew** **60** **Left**

TABLE 3

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIN	WC	TL		X	xs
2	2.00	1.50	0.32	0.28	0.28	0.26	0.231	0.850		4.820	5.566

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.593 0.20	0.3	12	1.785	0	1.785	17 x 4 = 68	121.413	0.888	107.815
	E101	5.473	-	18	5.473	0	5.473	14 x 2 = 28	153.25	2.000	306.504
	E102	5.473	-	14	5.473	0	5.473	2 x 2 = 4	21.89	1.21	26.491
	E103	0.174 0.30 0.20 0.15	0.2	12	0.974	0	0.974	25 x 2 = 50	48.71	0.888	43.258
	H301	5.473	-	24	5.473	0	5.473	4 x 2 = 8	43.786	3.550	155.441
	H302	0.370 0.410 0.29 0.370	0.15	14	1.439	0	1.439	33 x 2 = 66	94.983	1.210	114.929
	H300 *WALL*	0.924 dowel	0.3	16	0.924	0	0.924	4 x 6 = 24	22.17	1.580	35.029
	H300 *BOT.SLAB*	0.924 dowel	0.15	16	0.924	0	0.924	33 x 2 = 66	60.97	1.580	96.330
	WALL *EXP. JT.*	0.800 dowel	0.3	16	0.800	0	0.800	4 x 6 = 24	19.20	1.580	30.336
	Top & Bot. *EXP. JT.*	0.800 dowel	0.15	16	0.800	0	0.800	66 x 2 = 132	105.60	1.580	166.848
										SUB TOTAL =	**1082.981**

Station **0 + 590.000** **skew** **60 ° INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	2.00	1.50	0.32	0.28	0.28	0.26	23.41300°	-1.10567°		4.820	4.302

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	5.450	as	14	5.450	0.00	5.450	2 x 1 = 2	10.900	1.21	13.189
	H202	0.25 0.30 0.555 0.378	0.15	14	1.483	0	1.483	33 x 1 = 33	48.933	1.21	59.208
	A100	4.187	as	12	4.187	0	4.187	6 x 3 = 18	75.358	0.888	66.917
	F201	0.25 0.728 0.361 0.307	0.14 0.2	14	1.786	0	1.786	22 x 2 = 44	78.568	1.21	95.067
	F202	0.25 0.25 0.361 0.394 0.361	0.2	14	1.615	0	1.615	22 x 1 = 22	35.535	1.21	42.998
	F300 G300	4.187	0.15	12	4.187	0	4.187	30 x 2 = 60	251.192	0.888	223.058
	L3 F301	ave = 2.550 x=0.15 max = 4.334 min = 0.766	0.2	12	2.700	0	2.700	12 x 2 = 24	64.795	0.888	57.538
	L3 G301	ave = 2.550 x=0.15 max = 4.334 min = 0.766	0.2	12	2.700	0	2.700	12 x 2 = 24	64.795	0.888	57.538
	L4 F301	4.740 x=0.15	0.2	12	5.040	0	5.040	9 x 1 = 9	45.360	0.888	40.280
	L4 G301	4.740 x=0.15	0.2	12	5.040	0	5.040	9 x 1 = 9	45.360	0.888	40.280
									TOTAL FOR INLET APRON		**696.075**

Station 0 + 590.000 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	2.00	1.50	0.32	0.28	0.28	0.26	23.41300°	1.10567°		4.820	4.302

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	4.480	as	12	4.480	0	4.480	2 x 3 = 6	26.877	0.888	23.867
	B101	0.15 ave =1.007 0.34 max =1.861 min 0.153	0.15	14	1.497	0	1.497	29 x 2 = 58	86.83	1.210	105.059
	C101	0.15 ave =1.007 0.20 max =1.861 min 0.153	0.15	12	1.357	0	1.357	29 x 2 = 58	78.71	0.888	69.891
	D101	0.15 ave =1.007 0.32 max =1.861 min 0.153	0.15	14	1.477	0	1.477	29 x 2 = 58	85.67	1.210	103.655
	A101	ave =2.122 max =3.849 min =0.395	0.15	12	2.122	0	2.122	10 x 6 = 60	127.319	0.888	113.059
	A300	0.327 0.06 0.200 0.5	0.15	12	1.087	0	1.087	12 x 2 = 24	26.078	0.888	23.158
	B109	0.300 2.04	as	20	2.340	0	2.340	1 x 2 = 2	4.680	2.47	11.560
	B110	0.300 2.04	as	20	2.340	0	2.340	1 x 2 = 2	4.680	2.47	11.560
	B116	0.300 2.04	as	20	2.340	0	2.340	2 x 2 = 4	9.360	2.47	23.119
	C189	0.300 2.04	as	12	2.340	0	2.340	1 x 2 = 2	4.680	0.888	4.156
	C190	0.300 2.04	as	12	2.340	0	2.340	1 x 2 = 2	4.680	0.888	4.156
	D135	0.300 2.04	as	16	2.340	0	2.340	2 x 1 = 2	4.680	1.58	7.394
	D136	0.300 2.04	as	16	2.340	0	2.340	2 x 1 = 2	4.680	1.58	7.394
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	11 x 1 = 11	8.580	0.888	7.619
									TOTAL FOR INLET WING WALL		**515.646**

Station 0 + 590.000 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	2.00	1.50	0.32	0.28	0.28	0.26	23.413°			4.820	4.302

TOE WALL (INLET)	A205	5.450	as	14	5.450	0	5.450	10 x 1 = 10	54.502	1.21	65.947
	A203	0.173 0.774 0.800 0.196	0.15	14	2.743	0	2.743	37 x 1 = 37	101.497	1.21	122.811
									TOTAL FOR INLET TOE WALL		**188.758**

Station **0 + 590.000** **skew** **60 ° OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	2.00	1.50	0.32	0.28	0.28	0.26	23.41300°	-1.10567°		4.820	3.935

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	5.450	as	14	5.450	0.00	5.450	2 x 1 = 2	10.900	1.21	13.189
	H202	0.25 0.30 0.555 0.378	0.15	14	1.483	0	1.483	33 x 1 = 33	48.933	1.21	59.208
	A100	3.820	as	12	3.820	0	3.820	6 x 3 = 18	68.752	0.888	61.051
	F201	0.25 0.728 0.361 0.307	0.14 0.2	14	1.786	0	1.786	20 x 2 = 40	71.425	1.21	86.425
	F202	0.25 0.25 0.361 0.394 0.361	0.2	14	1.615	0	1.615	20 x 1 = 20	32.305	1.21	39.089
	F300 G300	3.820	0.15	12	3.820	0	3.820	30 x 2 = 60	229.172	0.888	203.505
	L3 F301	ave =2.550 x=0.15 max =4.334 min =0.766	0.2	12	2.700	0	2.700	12 x 2 = 24	64.795	0.888	57.538
	L3 G301	ave =2.550 x=0.15 max =4.334 min =0.766	0.2	12	2.700	0	2.700	12 x 2 = 24	64.795	0.888	57.538
	L4 F301	4.740 x=0.15	0.2	12	5.040	0	5.040	7 x 1 = 7	35.280	0.888	31.329
	L4 G301	4.740 x=0.15	0.2	12	5.040	0	5.040	7 x 1 = 7	35.280	0.888	31.329
									TOTAL FOR OUTLET APRON		**640.201**

Station **0 + 590.000** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	2.00	1.50	0.32	0.28	0.28	0.26	23.41300°	-1.10567°		4.820	3.935

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	4.143	as	12	4.143	0	4.143	2 x 3 = 6	24.861	0.888	22.076
	B101	0.15 ave =1.009 0.34 max =1.861 min 0.156	0.15	14	1.499	0	1.499	26 x 2 = 52	77.93	1.210	94.300
	C101	0.15 ave =1.009 0.20 max =1.861 min 0.156	0.15	12	1.359	0	1.359	26 x 2 = 52	70.65	0.888	62.741
	D101	0.15 ave =1.009 0.32 max =1.861 min 0.156	0.15	14	1.479	0	1.479	26 x 2 = 52	76.89	1.210	93.042
	A101	ave =1.954 max =3.514 min =0.395	0.15	12	1.954	0	1.954	10 x 6 = 60	117.263	0.888	104.129
	A300	0.327 0.06 0.200 0.5	0.15	12	1.087	0	1.087	12 x 2 = 24	26.078	0.888	23.158
	B109	0.300 2.04	as	20	2.340	0	2.340	1 x 2 = 2	4.680	2.47	11.560
	B110	0.300 2.04	as	20	2.340	0	2.340	1 x 2 = 2	4.680	2.47	11.560
	B116	0.300 2.04	as	20	2.340	0	2.340	2 x 2 = 4	9.360	2.47	23.119
	C189	0.300 2.04	as	12	2.340	0	2.340	1 x 2 = 2	4.680	0.888	4.156
	C190	0.300 2.04	as	12	2.340	0	2.340	1 x 2 = 2	4.680	0.888	4.156
	D135	0.300 2.04	as	16	2.340	0	2.340	2 x 1 = 2	4.680	1.58	7.394
	D136	0.300 2.04	as	16	2.340	0	2.340	2 x 1 = 2	4.680	1.58	7.394
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	11 x 1 = 11	8.580	0.888	7.619
									TOTAL FOR OUTLET WING WALL		**476.404**

Station **0 + 590.000** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	2.00	1.50	0.32	0.28	0.28	0.26	23.413°			4.820	3.935

TOE WALL (OUTLET)	A205	5.450	as	14	5.450	0	5.450	20 x 1 = 20	109.004	1.21	131.894
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	37 x 1 = 37	175.497	1.21	212.351
									TOTAL FOR OUTLET TOE WALL		**344.245**

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **50201 REINFORCING STEEL (Grade 60)** Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 0 + 590.000 skew 60° Left

TABLE 3

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	2.00	1.50	0.32	0.28	0.28	0.26	0.23	0.85	73.913	4.820	5.566

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	107.815	1,552.915
E103		43.258	
W.W		1,401.841	
A	14	1,467.122	14,287.505
B		3,086.766	
F		1,128.301	
G		1,384.228	
LONG'L		5,742.236	
E102		26.491	
H302		114.929	
W.W		1,337.434	
H300		131.359	
E.J	16	197.184	358.120
W.W		29.578	
E101	18	306.504	306.504
D	20	7,886.658	7,979.135
W.W		92.477	
	22	0.000	0.000
H301	24	155.441	155.441
	25	0.000	0.000
		TOTAL WEIGHT =	**24,639.620**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 0 + 590.000 skew 60° Left

TABLE 3

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	2.00	1.50	0.32	0.28	0.28	0.26	0.231	0.85	73.913	4.820	5.566

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	99.753
BOTTOM SLAB	Vol. = Length * X * T1	114.003
OUTER WALLS	Vol. = Length * H * 2W1	62.087
INNER WALLS	Vol. = Length * H * W2	28.826
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.111
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.501
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.370
	TOTAL VOLUME =	**305.651**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 0 + 590.000 skew 60° Left

TABLE 3

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
2	2.00	1.50	0.32	0.28	0.28	0.26	4.302	3.935	0.250	4.820	5.566

X2	SLOPE
0.22	2.309: 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	5.184
APRON OUTLET	Vol. = Lo * X * T	4.742
TOE WALL INLET	Vol. = XS * T * (1-T)	1.044
TOE WALL OUTLET	Vol. = XS * T * (2-T)	2.435
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	1.611
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	1.476
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.995
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.911
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.380
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.341
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.201
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.180
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.459
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.459
	TOTAL VOLUME =	**20.418**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station **968+703.240**

RCBC **2 - 3.00 x 1.00**

R. C. B. C.

T1 = 0.36 W1 = 0.32
T2 = 0.32 W2 = 0.20
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2222.420
B.C. slope = 0.02302

Skew = 90 ° Normal
P.G.L. = 2224.375
SL = 0.038790 SR = 0.038790
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station **968+703.240** **skew** **90°** **Normal**

	S	H	T1	T2	W1	W2	NON-STANDARD		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1	No. of Pane	TOTAL
2	3.00	1.00	0.36	0.32	0.32	0.20	0.50	6.84	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	1	2.37 / 1.58 / 2.37	0.15	20	6.32	0	6.32	134 x 2 = 268	1693.76	2.47	4183.587
	2	x=0.24 / 6.74	0.15	20	7.22	0	7.22	134 x 1 = 134	967.48	2.47	2389.676
	3	6.74 / x=0.28	0.15	14	7.3	0	7.3	134 x 1 = 134	978.200	1.21	1183.622
	4	1.58 / x=0.25	0.15	12	2.08	0	2.08	134 x 2 = 268	557.44	0.888	495.007
	Top SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	35 x 1 = 35	721.700	0.888	640.870
	WALLS 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	6 x 6 = 36	742.320	0.888	659.180
	BOT SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	35 x 2 = 70	1443.400	0.888	1281.739
	TOP SLAB 6 20.000	12 / 8.740 / O.L.=60*Ø	0.20	14	20.740	0	20.740	35 x 1 = 35	725.900	1.210	878.339
	7	4.700	0.15	25	4.700	0	4.700	134 x 1 = 134	629.800	3.850	2424.730
	8	4.160	0.15	16	4.160	0	4.160	134 x 1 = 134	557.440	1.580	880.755
	9	1.58 / x=0.40	0.15	20	2.380	0	2.380	134 x 2 = 268	637.840	2.470	1575.465
										SUB TOTAL =	**16592.969**

Station 968+703.240 skew 90 Normal

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	NON-STANDARD SLOPE	X	BARREL LENGTH P2		TOTAL
2	3.00	1.00	0.36	0.32	0.32	0.20	0.32139	6.84	13.725		13.725

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 13.725 m.	1	2.37 1.58 2.37	0.15	20	6.32	0	6.32	92 x 2 = 184	1162.88	2.47	2872.314
	2	x=0.24 6.74	0.15	20	7.22	0	7.22	92 x 1 = 92	664.24	2.47	1640.673
	3	6.74 x=0.28	0.15	14	7.3	0	7.3	92 x 1 = 92	671.600	1.21	812.636
	4	1.58 x=0.25	0.15	12	2.08	0	2.08	92 x 2 = 184	382.72	0.888	339.855
	Top SLAB 5 13.725	12 2.345 O.L.=60*Ø	0.20	12	14.345	0	14.345	35 x 1 = 35	502.075	0.888	445.843
	WALLS 5 13.725	12 2.345 O.L.=60*Ø	0.20	12	14.345	0	14.345	6 x 6 = 36	516.420	0.888	458.581
	BOT SLAB 5 13.725	12 2.345 O.L.=60*Ø	0.20	12	14.345	0	14.345	35 x 2 = 70	1004.150	0.888	891.685
	TOP SLAB 6 13.725	12 2.465 O.L.=60*Ø	0.20	14	14.465	0	14.465	35 x 1 = 35	506.275	1.210	612.593
	7	4.700	0.15	25	4.700	0	4.700	92 x 1 = 92	432.400	3.850	1664.740
	8	4.160	0.15	16	4.160	0	4.160	92 x 1 = 92	382.720	1.580	604.698
	9	1.58 x=0.40	0.15	20	2.380	0	2.380	92 x 2 = 184	437.920	2.470	1081.662
										SUB TOTAL =	**11425.279**

Station 968+703.240 skew 90 Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIN	WC	TL		X	xs
2	3.00	1.00	0.36	0.32	0.32	0.20	0.200	0.600		6.840	6.840

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.347 0.24	0.3	12	1.373	0	1.373	23 x 4 = 92	126.347	0.888	112.196
	E101	6.760	-	22	6.760	0	6.760	10 x 2 = 20	135.20	2.980	402.896
	E102	6.760	-	14	6.760	0	6.760	2 x 2 = 4	27.04	1.21	32.718
	E103	0.120 0.34 0.24 0.15	0.2	12	1.000	0	1.000	35 x 2 = 70	70.00	0.888	62.160
	H301	6.760	-	24	6.760	0	6.760	4 x 2 = 8	54.080	3.550	191.984
	H302	0.320 0.537 0.38 0.320	0.15	14	1.557	0	1.557	46 x 2 = 92	143.281	1.210	173.370
	H300 *WALL*	0.800 dowel	0.3	16	0.800	0	0.800	3 x 4 = 12	9.60	1.580	15.168
	H300 *BOT.SLAB*	0.800 dowel	0.15	16	0.800	0	0.800	46 x 2 = 92	73.60	1.580	116.288
	WALL *EXP. JT.*	0.800 dowel	0.3	16	0.800	0	0.800	3 x 2 = 6	4.80	1.580	7.584
	Top & Bot. *EXP. JT.*	0.800 dowel	0.15	16	0.800	0	0.800	92 x 1 = 92	73.60	1.580	116.288
										SUB TOTAL =	**1230.652**

Station 968+703.240 skew 90 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.56500°	1.31871°		6.840	2.524

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	6.740	as	14	6.740	0.00	6.740	2 x 1 = 2	13.480	1.21	16.311
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	46 x 1 = 46	61.350	1.21	74.233
	A100	2.424	as	12	2.424	0	2.424	6 x 3 = 18	43.632	0.888	38.745
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	13 x 2 = 26	47.151	1.21	57.052
	F202	0.25 0.25 0.346 0.334 0.346	0.2	14	1.527	0	1.527	13 x 1 = 13	19.851	1.21	24.019
	F300 G300	2.424	0.15	12	2.424	0	2.424	42 x 2 = 84	203.616	0.888	180.811
	L4 F301	6.760 x=0.15	0.15	12	7.060	0	7.060	17 x 1 = 17	120.020	0.888	106.578
	L4 G301	6.760 x=0.15	0.15	12	7.060	0	7.060	17 x 1 = 17	120.020	0.888	106.578
									TOTAL FOR INLET APRON		**604.327**

Station 968+703.240 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.56500°	-1.31871°		6.840	2.524

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	2.675	as	12	2.675	0	2.675	2 x 3 = 6	16.048	0.888	14.251
	B101	0.15 ave = 0.778 0.38 max = 1.394 min = 0.161	0.15	14	1.308	0	1.308	17 x 2 = 34	44.47	1.210	53.804
	C101	0.15 ave = 0.778 0.24 max = 1.394 min = 0.161	0.15	12	1.168	0	1.168	17 x 2 = 34	39.71	0.888	35.259
	D101	0.15 ave = 0.778 0.26 max = 1.394 min = 0.161	0.15	14	1.188	0	1.188	17 x 2 = 34	40.39	1.210	48.867
	A101	ave = 1.237 max = 2.147 min = 0.328	0.15	12	1.237	0	1.237	7 x 6 = 42	51.969	0.888	46.149
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	9 x 2 = 18	20.509	0.888	18.212
	B109	0.300 1.62	as	20	1.920	0	1.920	1 x 2 = 2	3.840	2.47	9.485
	B110	0.300 1.62	as	20	1.920	0	1.920	1 x 2 = 2	3.840	2.47	9.485
	B116	0.300 1.62	as	20	1.920	0	1.920	2 x 2 = 4	7.680	2.47	18.970
	C189	0.300 1.62	as	12	1.920	0	1.920	1 x 2 = 2	3.840	0.888	3.410
	C190	0.300 1.62	as	12	1.920	0	1.920	1 x 2 = 2	3.840	0.888	3.410
	D135	0.300 1.62	as	16	1.920	0	1.920	2 x 1 = 2	3.840	1.58	6.067
	D136	0.300 1.62	as	16	1.920	0	1.920	2 x 1 = 2	3.840	1.58	6.067
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	8 x 1 = 8	5.760	0.888	5.115
									TOTAL FOR INLET WING WALL		**278.551**

Station 968+703.240 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.565°			6.840	2.524
TOE WALL (INLET)	A205	6.740	as	14	6.740	0	6.740	10 x 1 = 10	67.400	1.21	81.554
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	46 x 1 = 46	119.140	1.21	144.159
									TOTAL FOR INLET TOE WALL		**225.713**

Station 968+703.240 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.56500°	1.31871°		6.840	2.767

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	6.740	as	14	6.740	0.00	6.740	2 x 1 = 2	13.480	1.21	16.311
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	46 x 1 = 46	61.350	1.21	74.233
	A100	2.667	as	12	2.667	0	2.667	6 x 3 = 18	48.006	0.888	42.629
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	14 x 2 = 28	50.778	1.21	61.441
	F202	0.25 0.25 0.346 0.334 0.346	0.2	14	1.527	0	1.527	14 x 1 = 14	21.378	1.21	25.867
	F300 G300	2.667	0.15	12	2.667	0	2.667	42 x 2 = 84	224.028	0.888	198.937
	L4 F301	6.760 x=0.15	0.15	12	7.060	0	7.060	19 x 1 = 19	134.140	0.888	119.116
	L4 G301	6.760 x=0.15	0.15	12	7.060	0	7.060	19 x 1 = 19	134.140	0.888	119.116
									TOTAL FOR OUTLET APRON		**657.650**

Station 968+703.240 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.56500°	1.31871°		6.840	2.767

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	2.891	as	12	2.891	0	2.891	2 x 3 = 6	17.345	0.888	15.403
	B101	0.15 ave =0.776 0.38 max =1.394 min 0.157	0.15	14	1.306	0	1.306	18 x 2 = 36	47.01	1.210	56.879
	C101	0.15 ave =0.776 0.24 max =1.394 min 0.157	0.15	12	1.166	0	1.166	18 x 2 = 36	41.97	0.888	37.267
	D101	0.15 ave =0.776 0.26 max =1.394 min 0.157	0.15	14	1.186	0	1.186	18 x 2 = 36	42.69	1.210	51.652
	A101	ave =1.345 max =2.361 min =0.328	0.15	12	1.345	0	1.345	7 x 6 = 42	56.470	0.888	50.145
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	9 x 2 = 18	20.509	0.888	18.212
	B109	0.300 1.62	as	20	1.920	0	1.920	1 x 2 = 2	3.840	2.47	9.485
	B110	0.300 1.62	as	20	1.920	0	1.920	1 x 2 = 2	3.840	2.47	9.485
	B116	0.300 1.62	as	20	1.920	0	1.920	2 x 2 = 4	7.680	2.47	18.970
	C189	0.300 1.62	as	12	1.920	0	1.920	1 x 2 = 2	3.840	0.888	3.410
	C190	0.300 1.62	as	12	1.920	0	1.920	1 x 2 = 2	3.840	0.888	3.410
	D135	0.300 1.62	as	16	1.920	0	1.920	2 x 1 = 2	3.840	1.58	6.067
	D136	0.300 1.62	as	16	1.920	0	1.920	2 x 1 = 2	3.840	1.58	6.067
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	8 x 1 = 8	5.760	0.888	5.115
									TOTAL FOR OUTLET WING WALL		**291.566**

Station 968+703.240 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.565°			6.840	2.767

TOE WALL (OUTLET)	A205	6.740	as	14	6.740	0	6.740	20 x 1 = 20	134.800	1.21	163.108
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	46 x 1 = 46	211.140	1.21	255.479
									TOTAL FOR OUTLET TOE WALL		**418.587**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 968+703.240 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	3.00	1.00	0.36	0.32	0.32	0.20	0.20	0.60	33.725	6.840	6.840

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
04	12	834.862	6,558.394
05		4,377.898	
S100		112.196	
E103		62.160	
W.W.		1,171.278	
03	14	1,996.258	4,898.248
06		1,490.932	
E102		32.718	
H302		173.370	
W.W.		1,204.970	
08	16	1,485.453	1,765.050
H300		131.456	
E.J.		123.872	
W.W.		24.269	
	18	0.000	0.000
01	20	7,055.901	13,819.255
02		4,030.348	
09		2,657.127	
W.W.		75.878	
E101	22	402.896	402.896
H301	24	191.984	191.984
07	25	4,089.470	4,089.470
		TOTAL WEIGHT =	**31,725.296**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 968+703.240 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	3.00	1.00	0.36	0.32	0.32	0.20	0.200	0.60	33.725	6.840	6.840

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	73.817
BOTTOM SLAB	Vol. = Length * X * T1	83.044
OUTER WALLS	Vol. = Length * H * 2W1	21.584
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	6.745
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.137
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.616
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.169
	TOTAL VOLUME =	**186.112**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 968+703.240 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
2	3.00	1.00	0.36	0.32	0.32	0.20	2.524	2.767	0.250	6.840	6.840

X2	SLOPE
0.24	2.000: 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	4.316
APRON OUTLET	Vol. = Lo * X * T	4.732
TOE WALL INLET	Vol. = XS * T * (1-T)	1.283
TOE WALL OUTLET	Vol. = XS * T * (2-T)	2.993
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.746
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.814
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.333
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.365
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.201
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.229
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.088
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.100
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.725
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.725
	TOTAL VOLUME =	**17.650**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station	44 + 298.920				
RCBC	2	1.50 x	1.00		
T1 =	0.26	W1 =	0.22		
T2 =	0.22	W2 =	0.20		
SSL =	2.000 =	2.3094			
SSR =	2.000 =	2.3094			
Inner Shoulder =	2.000				
Outer Shoulder =	3.000				
Shoulder Slope =	4.000				
C.L. ELEV.=	2024.589				
CULV. SLP =	0.02000				

R. C. B. C.
SKEW LEFT

Skew =	60 °	Left			
C.W. =	7.300				
H/MED. =	2.000				
Layer =	0.630				
t =	0.630		xleft =	2.921	
skew =	60		yleft =	0.727	
slope =	0.25		xright =	2.203	
rd. width =	14.300		yright =	0.551	
half med=	2.000				

Station 44+298.920

		PGL	S.E.						
1	44308.863	2026.675	0.03324079	a	17.221	b	9.943	c	19.885
2	44+307.176	2026.674	0.0343451	a	14.300	b	8.256	c	16.512
3	44+300.075	2026.676		a	2.000	b	1.155	c	2.309
4	44+298.920	2026.677		a		b		c	
5	44+297.765	2026.678		a	2.000	b	1.155	c	2.309
6	44+290.664	2026.689	0.036	a	14.300	b	8.256	c	16.512
7	44+289.392	2026.691	0.036	a	16.503	b	9.528	c	19.056

Station 44 + 298.920 Skew = 60 ° Left

CELL NO.	S SPAN	H HEIGHT	T1 BOT.SLAB	T2 TOP SLAB	W1 EXT.WALL	W2 IN. WALL	NON-STANDARD SLOPE	X	BARREL LENGTH P1	No. of Pane	TOTAL
2	1.50	1.00	0.26	0.22	0.22	0.20	0.43301	3.64	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	1	1.52 / 1.38 / 1.52	0.15	20	4.42	0	4.42	134 x 2 = 268	1184.56	2.47	2925.863
	2	x=0.14 / 3.54	0.15	20	3.82	0	3.82	134 x 1 = 134	511.88	2.47	1264.344
	3	3.54 / x=0.18	0.15	14	3.9	0	3.9	134 x 1 = 134	522.600	1.21	632.346
	4	1.38 / x=0.25	0.15	12	1.88	0	1.88	134 x 2 = 268	503.84	0.888	447.410
	Top SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	19 x 1 = 19	391.780	0.888	347.901
	WALLS 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	6 x 6 = 36	742.320	0.888	659.180
	BOT SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	19 x 2 = 38	783.560	0.888	695.801
	TOP SLAB 6 20.000	12 / 8.740 / O.L.=60*Ø	0.20	14	20.740	0	20.740	19 x 1 = 19	394.060	1.580	622.615
	7	2.900	0.15	20	2.900	0	2.900	134 x 1 = 134	388.600	2.470	959.842
	8	2.660	0.15	16	2.660	0	2.660	134 x 1 = 134	356.440	1.580	563.175
	9	1.38 / x=0.40	0.15	16	2.180	0	2.180	134 x 2 = 268	584.240	1.580	923.099
							2-CELLS			SUB TOTAL =	10041.576

Station 44 + 298.920 Skew = 60 Left

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P2=P3		TOTAL
2	1.50	1.00	0.26	0.22	0.22	0.20		3.64	9.008		9.008

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2=P3 9.008 m.	1	1.52 1.38 1.52	0.15	20	4.42	0	4.42	60 x 4 = 240	1060.80	2.47	2620.176
	2	x=0.14 3.54	0.15	20	3.82	0	3.82	60 x 2 = 120	458.4	2.47	1132.248
	3	3.54 x=0.18	0.15	14	3.9	0	3.9	60 x 2 = 120	468.000	1.21	566.280
	4	1.38 x=0.25	0.15	12	1.88	0	1.88	60 x 4 = 240	451.2	0.888	400.666
	Top SLAB 5 10.973	9.95 max= 10.973 min= 8.929	0.2	12	9.951	0	9.951	19 x 2 = 38	378.152	0.888	335.799
	Bot. SLAB 5 10.973	9.95 max= 10.973 min= 8.929	0.2	12	9.951	0	9.951	19 x 4 = 76	756.305	0.888	671.599
	EXT.WALL Short NF L= 8.929	0 8.929	0.20	12	8.929	0	8.929	6 x 2 12	107.152	0.888	95.151
	EXT.WALL Short FF L= 9.010	0 9.010	0.20	12	9.010	0	9.010	6 x 2 12	108.122	0.888	96.013
	EXT.WALL Long FF L= 10.892	0 10.892	0.20	12	10.892	0	10.892	6 x 2 12	130.708	0.888	116.069
	EXT.WALL Long NF 10.973	0 10.973	0.20	12	10.973	0	10.973	6 x 2 12	131.678	0.888	116.930
	INN..WALL Short L= 9.911	0 9.911	0.20	12	9.911	0	9.911	6 x 2 12	118.930	0.888	105.610
	INN..WALL Long L= 9.992	0 9.992	0.20	12	9.992	0	9.992	6 x 2 12	119.900	0.888	106.471
	Top SLAB 6 10.973	9.95 max= 10.973 min= 8.929	0.2	14	9.951	0	9.951	19 x 2 = 38	378.152	1.210	457.564
	7	2.900	0.15	20	2.900	0	2.900	60 x 2 = 120	348.000	2.470	859.560
	8	2.660	0.15	16	2.660	0	2.660	60 x 2 = 120	319.200	1.580	504.336
	9	1.38 x=0.40	0.15	16	2.180	0	2.180	60 x 4 = 240	523.200	1.580	826.656
										SUB TOTAL =	**9011.128**

Station 44 + 298.920 Skew = 60 Left

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P4=P6		TOTAL
2	1.50	1.00	0.26	0.22	0.22	0.20		3.64	1.051		1.051

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P4=P6 1.051 m.	1	1.52 1.38 1.52	0.15	20	4.420	0	4.420	7 x 2 = 14	61.88	2.47	152.844
	2	x=0.14 1.87	0.15	20	2.010	0	2.010	6 x 2 = 12	24.12	2.47	59.576
	2	x=0.14 1.67	0.15	20	1.810	0	1.810	1 x 2 = 2	3.620	2.47	8.941
	2 var.	x=0.14 0.911 max = 1.56 min =0.261	0.15	20	1.051	0	1.051	6 x 2 = 12	12.608	2.47	31.142
	3	x=0.18 1.87	0.15	14	2.050	0	2.050	6 x 2 = 12	24.6	1.21	29.766
	3	x=0.18 1.67	0.15	14	1.850	0	1.850	1 x 2 = 2	3.700	1.21	4.477
	3 var.	1.170 0.28 0.25 0.370 0.396 max = 1.56 min =0.781	0.15	14	2.466	0	2.466	4 x 2 = 8	19.728	1.21	23.870
	3	0.521 0.28 0.370 0.214	0.15	14	1.385	0	1.385	1 x 2 = 2	2.769	1.21	3.351
	3	0.261 0.28 0.261	0.15	14	0.802	0	0.802	1 x 2 = 2	1.605	1.21	1.942
	4	1.38 x=0.25	0.15	12	1.88	0	1.880	7 x 2 = 14	26.32	0.888	23.372
	7	2.130 max =2.910 min =1.350	0.15	20	2.130	0	2.130	7 x 2 = 14	29.821	2.470	73.659
	8	2.01 max =2.790 min = 1.230	0.15	16	2.000	0	2.000	7 x 2 = 14	28.000	1.580	44.240
	9	1.38 x=0.40	0.15	16	2.180	0	2.180	6 x 4 = 24	52.320	1.580	82.666
										SUB TOTAL =	**539.846**

Station 44 + 298.920 Skew = 60 Left

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P5 = P7		TOTAL
2	1.50	1.00	0.26	0.22	0.22	0.20		3.64	1.051		1.051

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 4 - 4 P5 = P7 1.051 m.	1-up	0.761 0.14 1.32 max =1.410 min =0.111	0.15	20	2.221	0	2.221	6 x 2 = 12	26.65	2.47	65.821
	1-down	1.36 0.761 max =1.410 min =0.111	0.15	20	2.121	0	2.121	6 x 2 = 12	25.45	2.47	62.857
	2	x=0.14 0.761 max =1.410 min =0.111	0.15	20	1.041	0	1.041	6 x 2 = 12	12.488	2.47	30.845
	3	1.150 0.28 0.25 0.370 0.396 0.18 max =1.410 min =0.891	0.15	14	2.626	0	2.626	3 x 2 = 6	15.755	1.21	19.064
	3	0.631 0.28 0.370 0.369 0.18	0.15	14	1.830	0	1.830	1 x 2 = 2	3.659	1.21	4.428
	3	0.371 0.28 0.370 0.18	0.15	14	1.200	0	1.200	1 x 2 = 2	2.401	1.21	2.905
	3	0.111 0.28 0.111 0.18	0.15	14	0.682	0	0.682	1 x 2 = 2	1.365	1.21	1.651
	4	0.14 x=0.25	0.15	12	0.64	0	0.64	6 x 2 = 12	7.68	0.888	6.820
										SUB TOTAL =	**194.390**

Station 44 + 298.920 skew 60

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS		X	xs
2	1.50	1.00	0.22	0.20	0.26	0.231	0.85	0.22		3.640	4.203

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	B01	4.088	-	18	4.088	0	4.088	14 x 2 = 28	114.45	2.000	228.908
	B02	0.770 0.14	0.2	12	2.020	0	2.020	19 x 2 = 38	76.760	0.888	68.163
	B03	0.154 0.14	0.2	10	0.788	0	0.788	19 x 4 = 76	59.888	0.617	36.951
	B04	4.088	-	14	4.088	0	4.088	6 x 2 = 12	49.052	1.210	59.353
	Y12	4.088	-	12	4.088	0	4.088	2 x 2 = 4	16.35	0.888	14.519
	Y12-200	0.165 0.24 0.14 0.15	0.2	12	0.845	0	0.845	19 x 2 = 38	32.10	0.888	28.506
	H300 *WALL*	0.924 dowel	0.3	16	0.924	0	0.924	3 x 6 = 18	16.63	1.580	26.272
	H300 *BOT.SLAB*	0.924 dowel	0.15	16	0.924	0	0.924	25 x 2 = 50	46.19	1.580	72.977
	WALL *EXP. JT.*	0.80 dowel	0.3	16	0.800	0	0.800	3 x 6 = 18	14.40	1.580	22.752
	Top & Bot. *EXP. JT.*	0.80 dowel	0.15	16	0.800	0	0.800	50 x 2 = 100	80.00	1.580	126.400
										SUB TOTAL =	**684.800**

Station **44 + 298.920** **skew** **60 ° INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	23.41300°	1.14576°		3.640	2.693

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	4.088	as	14	4.088	0.00	4.088	2 x 1 = 2	8.175	1.21	9.892
	H202	0.25 0.24 0.457 0.378	0.15	14	1.325	0	1.325	25 x 1 = 25	33.121	1.21	40.076
	A100	2.578	as	12	2.578	0	2.578	6 x 3 = 18	46.396	0.888	41.199
	F201	0.25 0.714 0.276 0.247	0.08 0.2	14	1.567	0	1.567	14 x 2 = 28	43.866	1.21	53.078
	F202	0.25 0.25 0.276 0.334 0.276	0.2	14	1.386	0	1.386	14 x 1 = 14	19.398	1.21	23.471
	F300 G300	2.578	0.15	12	2.578	0	2.578	22 x 2 = 44	113.411	0.888	100.709
	L3 F301	ave =1.960 x=0.15 max =3.154 min =0.766	0.2	12	2.110	0	2.110	9 x 2 = 18	37.977	0.888	33.723
	L3 G301	ave =1.960 x=0.15 max =3.154 min =0.766	0.2	12	2.110	0	2.110	9 x 2 = 18	37.977	0.888	33.723
	L4 F301	3.560 x=0.15	0.2	12	3.860	0	3.860	4 x 1 = 4	15.440	0.888	13.711
	L4 G301	3.560 x=0.15	0.2	12	3.860	0	3.860	4 x 1 = 4	15.440	0.888	13.711
									TOTAL FOR INLET APRON		**363.293**

Station 44 + 298.920 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	23.41300°	-1.14576°		3.640	2.693

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	2.781	as	12	2.781	0	2.781	2 x 3 = 6	16.687	0.888	14.818
	B101	0.15 ave =0.729 0.28 max =1.301 min =0.156	0.15	14	1.159	0	1.159	18 x 2 = 36	41.71	1.210	50.474
	C101	0.15 ave =0.729 0.14 max =1.301 min =0.156	0.15	12	1.019	0	1.019	18 x 2 = 36	36.67	0.888	32.566
	D101	0.15 ave =0.729 0.26 max =1.301 min =0.156	0.15	14	1.139	0	1.139	18 x 2 = 36	40.99	1.210	49.603
	A101	ave =1.334 max =2.272 min =0.395	0.15	12	1.334	0	1.334	7 x 6 = 42	56.009	0.888	49.736
	A300	0.229 0.06 0.140 0.5	0.15	12	0.929	0	0.929	8 x 2 = 16	14.858	0.888	13.194
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	D135	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	D136	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	7 x 1 = 7	5.040	0.888	4.476
									TOTAL FOR INLET WING WALL		**265.833**

Station **44 + 298.920** **skew** **60** °

										BARREL WIDTH	APRON LENGTH
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			X1	L1
2	1.50	1.00	0.26	0.22	0.22	0.20	23.413 °			3.640	2.693
TOE WALL (INLET)	A205	4.088	as	14	4.088	0	4.088	10 x 1 = 10	40.876	1.21	49.460
	A203	0.173 0.774 0.800 0.196	0.15	14	2.743	0	2.743	28 x 1 = 28	76.808	1.21	92.938
									TOTAL FOR INLET TOE WALL		**142.398**

Station **44 + 298.920** **skew** **60** ° **OUTLET**

										BARREL WIDTH	APRON LENGTH
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		X1	L1
2	1.50	1.00	0.26	0.22	0.22	0.20	23.41300°	1.14576°		3.640	2.954

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	4.088	as	14	4.088	0.00	4.088	2 x 1 = 2	8.175	1.21	9.892
	H202	0.25 0.24 0.457 0.378	0.15	14	1.325	0	1.325	25 x 1 = 25	33.121	1.21	40.076
	A100	2.839	as	12	2.839	0	2.839	6 x 3 = 18	51.094	0.888	45.371
	F201	0.25 0.714 0.276 0.247	0.08 0.2	14	1.567	0	1.567	15 x 2 = 30	46.999	1.21	56.869
	F202	0.25 0.25 0.276 0.334 0.276	0.2	14	1.386	0	1.386	15 x 1 = 15	20.783	1.21	25.148
	F300 G300	2.839	0.15	12	2.839	0	2.839	22 x 2 = 44	124.895	0.888	110.907
	L3 F301	ave =1.960 x=0.15 max =3.154 min =0.766	0.2	12	2.110	0	2.110	9 x 2 = 18	37.977	0.888	33.723
	L3 G301	ave =1.960 x=0.15 max =3.154 min =0.766	0.2	12	2.110	0	2.110	9 x 2 = 18	37.977	0.888	33.723
	L4 F301	3.560 x=0.15	0.2	12	3.860	0	3.860	5 x 1 = 5	19.300	0.888	17.138
	L4 G301	3.560 x=0.15	0.2	12	3.860	0	3.860	5 x 1 = 5	19.300	0.888	17.138
									TOTAL FOR OUTLET APRON		**389.986**

Station **44 + 298.920** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	23.41300°	1.14576°		3.640	2.954

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	3.020	as	12	3.020	0	3.020	2 x 3 = 6	18.119	0.888	16.090
	B101	0.15 ave =0.727 0.28 max =1.301 min =0.153	0.15	14	1.157	0	1.157	20 x 2 = 40	46.28	1.210	55.995
	C101	0.15 ave =0.727 0.14 max =1.301 min =0.153	0.15	12	1.017	0	1.017	20 x 2 = 40	40.68	0.888	36.121
	D101	0.15 ave =0.727 0.26 max =1.301 min =0.153	0.15	14	1.137	0	1.137	20 x 2 = 40	45.48	1.210	55.027
	A101	ave =1.448 max =2.500 min =0.395	0.15	12	1.448	0	1.448	7 x 6 = 42	60.797	0.888	53.988
	A300	0.229 0.06 0.140 0.5	0.15	12	0.929	0	0.929	8 x 2 = 16	14.858	0.888	13.194
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	D135	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	D136	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	7 x 1 = 7	5.040	0.888	4.476
									TOTAL FOR OUTLET WING WALL		**285.857**

Station **44 + 298.920** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	23.413°			3.640	2.954
TOE WALL (OUTLET)	A205	4.088	as	14	4.088	0	4.088	20 x 1 = 20	81.753	1.21	98.921
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	28 x 1 = 28	132.808	1.21	160.698
									TOTAL FOR OUTLET TOE WALL		**259.619**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 44 + 298.920 **skew** 60° **Left**

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	0.231	0.85	40.118	3.640	4.203

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
BO3	10	36.951	36.951
04	12	878.268	5,081.633
05		3,346.524	
B02		68.163	
Y12		43.025	
W.W.		745.654	
03	14	1,290.080	3,301.228
06		1,080.179	
B04		59.353	
W.W.		871.616	
08	16	1,111.751	3,214.313
09		1,832.421	
H300		99.249	
E.J.		149.152	
W.W.		21.741	
B01	18	228.908	228.908
01	20	5,827.560	10,315.692
02		2,527.097	
07		1,893.061	
W.W.		67.974	
	22	0.000	0.000
	24	0.000	0.000
	25	0.000	0.000
		TOTAL WEIGHT =	**22,178.725**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 44 + 298.920 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	0.231	0.85	40.118	3.640	4.203

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	32.126
BOTTOM SLAB	Vol. = Length * X * T1	37.968
OUTER WALLS	Vol. = Length * H * 2W1	17.652
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	8.024
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.084
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.378
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.201
	TOTAL VOLUME =	**96.433**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 44 + 298.920 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNES S (T)	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	2.693	2.954	0.250	3.640	4.203

X2	SLOPE
0.2	2.309 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	2.451
APRON OUTLET	Vol. = Lo * X * T	2.688
TOE WALL INLET	Vol. = XS * T * (1-T)	0.788
TOE WALL OUTLET	Vol. = XS * T * (2-T)	1.839
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.655
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.719
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.329
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.360
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.191
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.216
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.102
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.115
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.210
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	0.210
	TOTAL VOLUME =	**10.873**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

NO. OF VENTS	DIMENSIONS (mm)						CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT																					
							REINFORCEMENT																					
	B	D	TOW	TIW	TBS	TTS	01		02		03		04		05		06		07		08		09		10		11	
							SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG
1	1000	1000	200	200	240	200	16	150	20	150	14	150	12	150	12	200	16	200										
2							16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150				
3							16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150
4							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
1	1500	1000	220	200	260	220	20	150	25	150	14	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	1500	1500	220	220	260	220	16	150	25	150	14	150	12	150	12	200	16	200										
2							16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
1	2000	1000	240	200	280	240	20	150	25	150	14	150	12	150	12	200	16	200										
2							20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
4							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
5							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
1	2000	1500	240	220	280	240	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
4							20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
5							25	150	25	150	14	150	14	150	12	200	16	200	25	150	20	150	20	150	20	150	12	150
1	2000	2000	240	240	280	240	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	16	150	16	150	12	200	16	200	25	150	16	150	16	150				
3							20	150	25	150	16	150	16	150	12	200	16	200	25	150	20	150	16	150	25	150	12	150
4							20	150	25	150	14	150	16	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150
5							25	150	25	150	14	150	16	150	12	200	16	200	25	150	20	150	20	150	20	150	12	150
1	2500	1000	280	200	320	280	20	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	2500	1500	280	220	320	280	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	2500	2000	280	240	320	280	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	16	150	14	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
5							20	150	20	150	16	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	2500	2500	280	260	320	280	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150				
3							20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150
4							20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	16	150	20	150	12	150
5							20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

NO. OF VENTS	CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT																											
	DIMENSIONS (mm)						REINFORCEMENT																					
	B	D	TOW	TIW	TBS	TTS	01		02		03		04		05		06		07		08		09		10		11	
							SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG
1	3000	1000	320	200	360	320	20	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	3000	1500	320	220	360	320	16	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	3000	2000	320	240	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							16	150	20	150	16	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3000	2500	320	260	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3000	3000	320	280	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
4							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
5							25	150	20	150	16	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
1	3500	1000	360	200	400	360	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3500	1500	360	220	400	360	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3500	2000	360	240	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
4							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
5							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
1	3500	2500	360	260	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
4							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
5							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
1	3500	3000	360	280	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	20	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150
4							20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150
5							20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
1	1000	1000	200	200	240	200	750	16	150	20	150	14	150	12	150	12	200	16	200											14 Y16	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150					14 Y16	Y12@200	2 Y10@200	6 Y14
3								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150	14 Y16	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y16	Y12@200	2 Y10@200	6 Y14
1	1500	1000	220	200	260	220	850	20	150	25	150	14	150	12	150	12	200	16	200											14 Y18	Y12@200	2 Y10@200	6 Y14
2								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150					14 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
1	1500	1500	220	220	260	220	850	16	150	25	150	14	150	12	150	12	200	16	200											14 Y18	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					14 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
1	2000	1000	240	200	280	240	950	20	150	25	150	14	150	12	150	12	200	16	200											14 Y20	Y12@200	2 Y10@200	6 Y16
2								20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					14 Y20	Y12@200	2 Y10@200	6 Y16
3								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y14
1	2000	1500	240	220	280	240	950	16	150	25	150	16	150	12	150	12	200	16	200											14 Y20	Y12@200	2 Y10@200	6 Y16
2								20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150					14 Y20	Y12@200	2 Y10@200	6 Y16
3								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y16
4								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y16
1	2500	1000	280	200	320	280	950	20	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y16
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y16
1	2500	1500	280	220	320	280	950	20	150	25	150	16	150	12	150	12	200	16	200											14 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1000	320	200	360	320	950	20	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150					14 Y22	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
1	3000	1500	320	200	360	320	950	16	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
1	3500	1000	360	200	400	360	950	20	150	25	150	16	150	12	150	12	200	16	200											14 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150					14 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	3000	360	280	400	360	950	16	150	25	150	16	150	12	150	12	200	16	200											14 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150					14 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	20	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150	14 Y25	Y12@200	2 Y10@200	6 Y25
4								20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150	14 Y25	Y12@200	2 Y10@200	6 Y25

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)							REINFORCEMENT																											
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
1	1000	1000	200	200	240	200	500	16	150	20	150	14	150	12	150	12	200	16	200											10 Y16	Y12@200	2 Y10@200	6 Y12
2								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150					10 Y16	Y12@200	2 Y10@200	6 Y12
3								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150	10 Y16	Y12@200	2 Y10@200	6 Y12
4								20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y16	Y12@200	2 Y10@200	6 Y12
1	1500	1000	220	200	260	220	600	20	150	25	150	14	150	12	150	12	200	16	200											10 Y18	Y12@200	2 Y10@200	6 Y14
2								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150					10 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
1	1500	1500	220	220	260	220	600	16	150	25	150	14	150	12	150	12	200	16	200											10 Y18	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					10 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
1	2000	1000	240	200	280	240	850	20	150	25	150	14	150	12	150	12	200	16	200											10 Y20	Y12@200	2 Y10@200	6 Y14
2								20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					10 Y20	Y12@200	2 Y10@200	6 Y14
3								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
1	2000	1500	240	220	280	240	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y20	Y12@200	2 Y10@200	6 Y14
2								20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150					10 Y20	Y12@200	2 Y10@200	6 Y14
3								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
1	2500	1000	280	200	320	280	850	20	150	20	150	14	150	12	150	12	200	14	200											10 Y22	Y12@200	2 Y10@200	6 Y16
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y16
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y16
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y16
1	2500	1500	280	220	320	280	850	20	150	25	150	16	150	12	150	12	200	16	200											10 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	2500	1500	280	220	320	280	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y22	Y12@200	2 Y10@200	6 Y20
2								20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1000	320	200	360	320	850	20	150	20	150	14	150	12	150	12	200	14	200											10 Y22	Y12@200	2 Y10@200	6 Y20
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150					10 Y22	Y12@200	2 Y10@200	6 Y20
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1500	320	220	360	320	850	16	150	20	150	14	150	12	150	12	200	14	200											10 Y25	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y20
1	3000	1500	320	220	360	320	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y25
2								16	150	20	150	16	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	1000	360	200	400	360	850	20	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	3000	360	280	400	360	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150	10 Y25	Y12@200	2 Y10@200	6 Y20

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
2	4000	4000	380	250	480	400	900	20	150	16	150	16	150	14	150	10	150	10	150	22	150	16	150	10	150					12 Y25	Y12@200	2 Y10@200	8 Y22
1	4500	2000	400	250	520	400	900																										
2								16	150	20	150	16	150	12	150	12	150	12	150	22	150	16	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	2500	400	250	520	400	900																										
2								16	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	3000	400	250	520	400	900																										
2								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	18	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	3500	400	250	520	400	900																										
2								18	150	20	150	18	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	18	150	12	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								20	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	4000	400	250	520	400	900																										
2								20	150	20	150	18	150	14	150	12	150	12	150	25	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								20	150	22	150	18	150	14	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								20	150	22	150	18	150	14	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	45000	400	250	520	400	900																										
2								22	150	20	150	18	150	16	150	12	150	12	150	25	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								22	150	22	150	18	150	16	150	12	150	12	150	22	150	18	150	12	150	20	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								22	150	22	150	18	150	16	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	

NOTES:

1. DESIGN WAS MADE ACCORDING TO M.O.C. MANUAL.
2. CONCRETE SPECIFIED CYLINDER STRENGTH 270 KGS/CM² AFTER 28 DAYS.
3. REINFORCEMENT STEEL YIELD STRENGTH 4200 KG/CM²
4. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE MENTIONED
5. CONCRETE COVER:
   - TOP SLAB
     - TOP REINFORCEMENT = 50mm
     - BOTTOM REINF. = 30mm.
   - BOTTOM SLAB & EXTERNAL WALLS
     - EXTERNAL REINF. = 50mm.
     - INTERNAL REINF. = 30mm.
   - INTERNAL WALLS REINF. = 30mm.
6. FOR R.C. BOX CULVERTS WITH 11 VENTS USE TWO SECTIONS 4 VENTS R.C. BOX CULVERTS PLUS ONE SECTION 3 VENTS R.C. BOX CULVERT WITH INTERMEDIATE EXPANSION JOINTS
7. FOR R.C. BOX CULVERTS WITH 15 & 20 VENTS USE 3 & 4 SECTIONS 5 VENTS R.C. BOX CULVERTS RESPECTIVELY WITH INTERMEDIATE EXPANSION JOINTS

TWO CELLS R.C. BOX CULVERT

ONE CELL R.C. BOX CULVERT

THREE CELLS R.C. BOX CULVERT

FOUR CELLS R.C. BOX CULVERT

FIVE CELLS R.C. BOX CULVERT

BOX CULVERT ENDut cursor here f

ONE CELL R.C. BOX CULVERT

FOUR CELLS R.C. BOX CULVERT

TWO CELLS R.C. BOX CULVERT

THREE CELLS R.C. BOX CULVERT

ut cursor here f

BOX CULVERT
END DETAIL PLANS
45º SKEW & 60º SKEW

TYPICAL END PLAN
Box Culvert One Cell

TYPICAL END PLAN
Box Culvert Two Cells

TYPICAL END PLAN
Box Culvert Three Cells

TYPICAL END PLAN
Box Culvert Four Cells

TYPICAL END PLAN
Box Culvert Four Cells

TYPICAL END PLAN
Box Culvert Three Cells

TYPICAL END PLAN
Box Culvert Two Cells

TYPICAL END PLAN
Box Culvert One Cell

WALL & BARREL ELEVATION

PART LONGITUDINAL SECTION

EDGE CURB WIDTH	
EMBANKMENT SLOPE	WIDTH (WC)
6 : 1	0.60
4 : 1	0.40
3 : 1	0.30
2 : 1	0.20

PART SEC. A – A

DETAIL " A "

RCBC 2 - CELLS

CROSS - SECTIONAL DIMENSIONS & REINFORCEMENT

RCBC CELL DIMENSIONS						R E I N F O R C E M E N T																									
SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT END SECTION OF CULVERT						**TABLE 1 - 1.50m. FILL COVER OR LESS**																									
1.00	1.00	0.24	0.20	0.20	0.20	14	0.44	0.97	14	0.44	1.96	-	-	-	16	0.18	2.52	-	-	-	14	0.44	1.82	14	0.44	1.57	15	19	7	3	51
1.50	1.00	0.25	0.22	0.22	0.20	14	0.40	1.19	14	0.40	2.66	-	-	-	20	0.22	3.56	-	-	-	14	0.40	1.86	14	0.44	1.61	19	25	7	3	61
	1.50				0.22		0.40	1.34		0.40	2.68		-	-		0.22	3.58		-	-		0.40	2.36		0.44	2.11			9	4	66
2.00	1.00	0.28	0.24	0.24	0.20	14	0.24	1.40	14	0.36	3.35	-	-	-	20	0.20	4.60	-	-	-	14	0.36	1.90	14	0.44	1.65	23	33	7	3	73
	1.50				0.22		0.24	1.55		0.36	3.37		-	-		0.20	4.62		-	-		0.36	2.40		0.44	2.15			9	4	78
	2.00				0.24		0.24	1.70		0.36	3.39		-	-		0.20	4.64		-	-		0.36	2.90		0.44	2.65			11	5	83
2.50	1.00	0.32	0.28	0.28	0.20	16	0.32	1.66	14	0.32	4.07	-	-	-	20	0.20	5.68	-	-	-	14	0.32	1.98	14	0.44	1.73	27	35	7	3	79
	1.50				0.22		0.32	1.81		0.32	4.09		-	-		0.20	5.70		-	-		0.32	2.48		0.44	2.23			9	4	84
	2.00				0.24		0.32	1.96		0.32	4.11		-	-		0.20	5.72		-	-		0.32	2.98		0.44	2.73			11	5	89
	2.50				0.26		0.32	2.11		0.32	4.13		-	-		0.20	5.74		-	-		0.32	3.48		0.44	3.23			13	6	94
3.00	1.00	0.36	0.32	0.32	0.20	16	0.36	1.91	14	0.24	4.78	-	-	-	20	0.22	6.76	-	-	-	14	0.24	2.06	14	0.44	1.81	31	37	7	3	85
	1.50				0.22		0.36	2.06		0.24	4.80		-	-		0.20	6.78		-	-		0.24	2.56		0.44	2.31			9	4	90
	2.00				0.24		0.36	2.21		0.24	4.82		-	-		0.20	6.80		-	-		0.24	3.06		0.44	2.81			11	5	95
	2.50				0.26		0.36	2.36		0.24	4.84		-	-		0.20	6.82		-	-		0.24	3.56		0.44	3.31			13	6	100
	3.00				0.28		0.36	2.51		0.24	4.86		-	-		0.20	6.84		-	-		0.24	4.06		0.44	3.81			15	7	105
3.50	1.00	0.40	0.36	0.36	0.20	16	0.42	2.17	16	0.28	5.55	-	-	-	24	0.32	7.84	-	-	-	14	0.28	2.14	14	0.44	1.89	35	41	7	3	93
	1.50				0.22		0.42	2.32		0.28	5.57		-	-		0.30	7.86		-	-		0.28	2.64		0.44	2.39			9	4	98
	2.00				0.24		0.42	2.47		0.28	5.59		-	-		0.30	7.88		-	-		0.28	3.14		0.44	2.89			11	5	103
	2.50				0.26		0.42	2.62		0.28	5.61		-	-		0.30	7.90		-	-		0.28	3.64		0.44	3.39			13	6	108
	3.00				0.28		0.42	2.77		0.28	5.63		-	-		0.28	7.92		-	-		0.28	4.14		0.44	3.89			15	7	113

RCBC 2 - CELLS

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT END SECTION OF CULVERT						**TABLE 2 - FILL COVER OVER 1.50m. TO 5.0m.**																									
1.00	1.00	0.24	0.20	0.20	0.20	14	0.44	0.97	14	0.44	1.96	-	-	-	14	0.44	2.52	-	-	-	14	0.44	1.82	14	0.44	1.57	15	15	7	3	47
1.50	1.00	0.25	0.22	0.22	0.20	14	0.42	1.19	14	0.42	2.66	-	-	-	14	0.40	3.56	-	-	-	14	0.42	1.86	14	0.44	1.61	19	19	7	3	55
	1.50				0.22		0.42	1.34		0.42	2.68		-	-		0.40	3.58		-	-		0.42	2.36		0.44	2.11			9	4	60
2.00	1.00	0.28	0.24	0.24	0.20	14	0.40	1.40	14	0.30	3.35	-	-	-	14	0.30	4.60	-	-	-	14	0.30	1.90	14	0.44	1.65	23	23	7	3	63
	1.50				0.22		0.40	1.55		0.30	3.37		-	-		0.30	4.62		-	-		0.30	2.40		0.44	2.15			9	4	68
	2.00				0.24		0.40	1.70		0.30	3.39		-	-		0.30	4.64		-	-		0.30	2.90		0.44	2.65			11	5	73
2.50	1.00	0.32	0.28	0.28	0.20	14	0.40	1.66	16	0.30	4.12	-	-	-	14	0.22	5.68	-	-	-	14	0.30	1.98	14	0.44	1.73	27	27	7	3	71
	1.50				0.22		0.40	1.81		0.30	4.14		-	-		0.22	5.70		-	-		0.30	2.48		0.44	2.23			9	4	76
	2.00				0.24		0.40	1.96		0.30	4.16		-	-		0.22	5.72		-	-		0.30	2.98		0.44	2.73			11	5	81
	2.50				0.26		0.40	2.11		0.30	4.18		-	-		0.22	5.74		-	-		0.30	3.48		0.44	3.25			13	6	86
3.00	1.00	0.36	0.32	0.32	0.20	14	0.36	1.91	16	0.24	4.83	-	-	-	14	0.18	6.76	-	-	-	14	0.24	2.06	14	0.44	1.81	31	31	7	3	79
	1.50				0.22		0.36	2.06		0.24	4.85		-	-		0.18	6.78		-	-		0.24	2.56		0.44	2.31			9	4	84
	2.00				0.24		0.36	2.21		0.24	4.87		-	-		0.18	6.80		-	-		0.24	3.06		0.44	2.81			11	5	89
	2.50				0.26		0.36	2.36		0.24	4.89		-	-		0.18	6.82		-	-		0.24	3.56		0.44	3.31			13	6	94
	3.00				0.28		0.36	2.51		0.24	4.91		-	-		0.18	6.84		-	-		0.24	4.06		0.44	3.81			15	7	99
3.50	1.00	0.40	0.36	0.36	0.20	14	0.32	2.17	20	0.32	5.60	-	-	-	16	0.22	7.84	-	-	-	14	0.32	2.14	14	0.44	1.89	35	35	7	3	87
	1.50				0.22		0.32	2.32		0.32	5.62		-	-		0.20	7.86		-	-		0.32	2.64		0.44	2.39			9	4	92
	2.00				0.24		0.32	2.47		0.32	5.64		-	-		0.20	7.88		-	-		0.32	3.14		0.44	2.89			11	5	97
	2.50				0.26		0.32	2.62		0.32	5.66		-	-		0.20	7.90		-	-		0.32	3.64		0.44	3.39			13	6	102
	3.00				0.28		0.32	2.77		0.32	5.68		-	-		0.20	7.92		-	-		0.32	4.14		0.44	3.89			15	7	107

RCBC 2 - CELLS

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT FIRST INTERMEDIATE SECTION						**TABLE 3 - FILL COVER OVER 5.0m. TO 10.0m.**																									
1.00	1.00	0.28	0.24	0.24	0.24	14	0.44	1.05	14	0.44	2.00	-	-	-	14	0.44	2.60	-	-	-	14	0.44	1.90	14	0.44	1.65	15	15	7	3	47
1.50	1.00	0.30	0.26	0.26	0.24	14	0.42	1.27	14	0.28	2.70	-	-	-	14	0.28	3.64	-	-	-	14	0.28	1.94	14	0.44	1.69	19	19	7	3	55
	1.50				0.26		0.42	1.42		0.28	2.72		-	-		0.28	3.66		-	-		0.28	2.44		0.44	2.19			9	4	60
2.00	1.00	0.32	0.28	0.28	0.24	14	0.36	1.48	16	0.24	3.44	-	-	-	14	0.20	4.68	-	-	-	14	0.24	1.98	14	0.44	1.73	23	23	7	3	63
	1.50				0.26		0.36	1.63		0.24	3.46		-	-		0.18	4.70		-	-		0.24	2.48		0.44	2.23			9	4	68
	2.00				0.28		0.36	1.78		0.24	3.48		-	-		0.18	4.72		-	-		0.24	2.98		0.44	2.73			11	5	73
2.50	1.00	0.36	0.32	0.32	0.24	14	0.42	1.74	20	0.28	4.21	-	-	-	16	0.20	5.76	-	-	-	14	0.28	2.06	14	0.44	1.81	27	27	7	3	71
	1.50				0.26		0.42	1.89		0.28	4.23		-	-		0.18	5.78		-	-		0.28	2.56		0.44	2.31			9	4	76
	2.00				0.28		0.42	2.04		0.28	4.25		-	-		0.18	5.80		-	-		0.28	3.06		0.44	2.81			11	5	81
	2.50				0.30		0.42	2.19		0.28	4.27		-	-		0.18	5.82		-	-		0.28	3.56		0.44	3.31			13	6	86
3.00	1.00	0.42	0.38	0.38	0.24	14	0.36	2.03	20	0.24	4.94	-	-	-	16	0.16	6.88	-	-	-	14	0.24	2.18	14	0.44	1.93	31	31	7	3	79
	1.50				0.26		0.36	2.18		0.24	4.96		-	-		0.16	6.90		-	-		0.24	2.68		0.44	2.43			9	4	84
	2.00				0.28		0.36	2.33		0.24	4.98		-	-		0.16	6.92		-	-		0.24	3.18		0.44	2.93			11	5	89
	2.50				0.30		0.36	2.48		0.24	5.00		-	-		0.16	6.94		-	-		0.24	3.68		0.44	3.43			13	6	94
	3.00				0.32		0.36	2.63		0.24	5.02		-	-		0.16	6.96		-	-		0.24	4.18		0.44	3.93			15	7	99
3.50	1.00	0.48	0.44	0.44	0.24	14	0.44	2.33	20	0.22	5.68	-	-	-	20	0.24	8.00	-	-	-	14	0.22	2.30	14	0.44	2.05	35	35	7	3	87
	1.50				0.26		0.44	2.48		0.22	5.70		-	-		0.22	8.02		-	-		0.22	2.80		0.44	2.55			9	4	92
	2.00				0.28		0.44	2.63		0.22	5.72		-	-		0.22	8.04		-	-		0.22	3.30		0.44	3.05			11	5	97
	2.50				0.30		0.44	2.78		0.22	5.74		-	-		0.22	8.06		-	-		0.22	3.80		0.44	3.55			13	6	102
	3.00				0.32		0.44	2.93		0.22	5.76		-	-		0.22	8.08		-	-		0.22	4.30		0.44	4.05			15	7	107

RCBC 2 - CELLS

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT SECOND INTERMEDIATE SECTION						**TABLE 4 - FILL COVER OVER 10.0m. TO 15.0m.**																									
1.00	1.00	0.32	0.28	0.28	0.28	14	0.40	1.13	14	0.40	2.04	-	-	-	14	0.36	2.68	-	-	-	14	0.40	1.98	14	0.44	1.73	15	15	7	3	47
1.50	1.00	0.34	0.30	0.30	0.28	14	0.42	1.35	16	0.28	2.79	-	-	-	14	0.22	3.72	-	-	-	14	0.28	2.02	14	0.44	1.77	19	19	7	3	55
	1.50				0.30		0.42	1.50		0.28	2.81		-	-		0.22	3.74		-	-		0.28	2.52		0.42	2.27			9	4	60
2.00	1.00	0.42	0.38	0.38	0.28	14	0.44	1.68	16	0.22	3.54	-	-	-	16	0.22	4.88	-	-	-	14	0.22	2.18	14	0.44	1.93	23	23	7	3	63
	1.50				0.30		0.44	1.83		0.22	3.56		-	-		0.22	4.90		-	-		0.22	2.68		0.42	2.43			9	4	68
	2.00				0.32		0.44	1.98		0.22	3.58		-	-		0.22	4.92		-	-		0.22	3.18		0.40	2.93			11	5	73
2.50	1.00	0.50	0.46	0.46	0.28	14	0.44	2.02	20	0.28	4.35	-	-	-	16	0.18	6.04	-	-	-	14	0.28	2.34	14	0.44	2.09	27	27	7	3	71
	1.50				0.30		0.44	2.17		0.28	4.37		-	-		0.18	6.06		-	-		0.28	2.84		0.42	2.59			9	4	76
	2.00				0.32		0.44	2.32		0.28	4.39		-	-		0.18	6.08		-	-		0.28	3.34		0.40	3.09			11	5	81
	2.50				0.34		0.44	2.47		0.28	4.41		-	-		0.18	6.10		-	-		0.28	3.84		0.36	3.59			13	6	86
3.00	1.00	0.58	0.54	0.54	0.28	14	0.36	2.35	20	0.24	5.10	-	-	-	20	0.24	7.20	-	-	-	14	0.24	2.50	14	0.44	2.25	31	31	7	3	79
	1.50				0.30		0.36	2.50		0.24	5.12		-	-		0.24	7.22		-	-		0.24	3.00		0.42	2.75			9	4	84
	2.00				0.32		0.36	2.65		0.24	5.14		-	-		0.24	7.24		-	-		0.24	3.50		0.40	3.25			11	5	89
	2.50				0.34		0.36	2.80		0.24	5.16		-	-		0.24	7.26		-	-		0.24	4.00		0.36	3.75			13	6	94
	3.00				0.36		0.36	2.95		0.24	5.18		-	-		0.24	7.28		-	-		0.24	4.50		0.34	4.25			15	7	99
3.50	1.00	0.68	0.64	0.64	0.28	14	0.40	2.73	20	0.20	5.88	-	-	-	20	0.22	8.40	-	-	-	14	0.20	2.70	14	0.44	2.45	35	35	7	3	87
	1.50				0.30		0.40	2.88		0.20	5.90		-	-		0.22	8.42		-	-		0.20	3.20		0.42	2.95			9	4	92
	2.00				0.32		0.40	3.03		0.20	5.92		-	-		0.22	8.44		-	-		0.20	3.70		0.40	3.45			11	5	97
	2.50				0.34		0.40	3.18		0.20	5.94		-	-		0.20	8.46		-	-		0.20	4.20		0.36	3.95			13	6	102
	3.00				0.36		0.40	3.33		0.20	5.96		-	-		0.20	8.48		-	-		0.20	4.70		0.34	4.45			15	7	107

RCBC 2 - CELLS

QUANTITIES PER METER OF CULVERT								
RCBC		FOR TABLE 1 & 2			TABLE 3		TABLE 4	
S	H	C C.M.	STEEL KGS. TAB 1	STEEL KGS. TAB 2	C C.M.	STL KGS.	C C.M.	STL KGS.
1.00	1.00	1.744	161	126	2.114	123	2.496	139
1.50	1.00	2.387	225	156	2.843	190	3.312	218
	1.50	2.747	241	172	3.264	207	3.795	236
2.00	1.00	3.114	302	213	3.656	278	5.008	306
	1.50	3.494	319	230	4.098	302	5.574	326
	2.00	3.894	336	246	4.560	320	6.160	345
2.50	1.00	4.216	359	286	4.851	318	7.075	405
	1.50	4.638	377	302	5.335	406	7.724	423
	2.00	5.080	395	319	5.838	423	8.394	442
	2.50	5.542	413	336	6.362	442	9.083	463
3.00	1.00	5.491	420	375	6.568	500	9.514	529
	1.50	5.955	454	393	7.114	513	10.246	549
	2.00	6.438	473	411	7.680	537	10.995	569
	2.50	6.942	492	429	8.266	557	11.771	591
	3.00	7.466	510	447	8.872	577	12.563	613
3.50	1.00	6.939	478	455	8.554	593	12.754	670
	1.50	7.444	508	484	9.162	627	13.590	691
	2.00	7.970	525	501	9.790	645	14.446	712
	2.50	8.515	543	518	10.439	665	15.323	755
	3.00	9.080	574	535	11.107	686	16.219	778

CUTTING & BENDING DIAGRAMS

BAR SIZE	MIN. X
14Ø	0.25
16Ø	0.30
20Ø	0.35
24Ø	0.40
32Ø	0.60

NOTES FOR REINFORCEMENT BARS

1.) FABRICATION & TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE
2.) ALL DIMENSIONS ARE OUT TO OUT BARS
3.) NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR UNLESS OTHERWISE NOTED
4.) WEIGHT MEASUREMENT FOR ESTIMATING PURPOSES IS MADE TO THE NEAREST KILOGRAM PER METER OF CULVERT.

NOTE:

CONSTRUCTION JOINTS PERPENDICULAR TO THE LONGITUDINAL AXIS OF THE CULVERT SHALL BE PROVIDED TO A MAXIMUM OF 30m. INTERVALS

NEW LOADING - 3 AXLE 600KN TRUCK

CONSTRUCTION JOINT DETAIL

TYPICAL NORMAL SECTION OF CULVERT

NOTE:

ALL TRANSVERSE & OTHER LONGI. REINF. ARE THE SAME AS THOSE SHOWN IN TYPICAL NORMAL SECTION

TOP SLAB FOR TABLE 1

NOTE ON SLAB BARS,
TERMINAL ENDS OF BARS FOR THE INTERMEDIATE SECTIONS SHALL BE IN LINE WITH THOSE FOR THE END SECTION OF CULVERT

BAR SPACES FOR 14Ø LONGITUDINAL REINF.							
s	a	b	e	f	H	c	d
1.00	2	3	1	3	1.00	3	2
1.50	3	4	1	5	1.50	4	3
2.00	4	5	2	6	2.00	5	4
2.50	5	6	2	6	2.50	6	5
3.00	6	7	2	6	3.00	7	6
3.50	7	8	2	7	-	-	-

NOTE MIN. LAP SPLICES FOR LONGIT. BARS SHALL BE 0.5m.

SCHEDULE OF EDGE BEAM				
NO.	SPAN	DIMENSIONS	MAIN REINFORCEMENT	STIRRUPS
FOR ANGLE = 90º				
1	1.00	0.50 m x 0.20 m	8 - 16 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.55 m x 0.22 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.60 m x 0.24 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.60 m x 0.28 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.60 m x 0.32 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.60 m x 0.36 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
FOR ANGLE = 60º				
1	1.00	0.50 m x 0.20 m	8 - 18 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.60 m x 0.22 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.65 m x 0.22 m	10 - 20 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.65 m x 0.28 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.65 m x 0.32 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.65 m x 0.36 m	10 - 24 E 101 (TOP & BOTTOM)	- DO -
FOR ANGLE = 45º				
1	1.00	0.70 m x 0.20 m	10 - 18 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.85 m x 0.22 m	14 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.95 m x 0.24 m	14 - 20 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.95 m x 0.26 m	14 - 22 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.95 m x 0.32 m	14 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.95 m x 0.36 m	14 - 24 E 101 (TOP & BOTTOM)	- DO -

EDGE CURB WIDTH	
EMBANKMENT SLOPE	WIDTH (WC)
6 : 1	0.60
4 : 1	0.40
3 : 1	0.30
2 : 1	0.20

BAR Ø	UNIT WT.
10	0.617
12	0.888
14	1.21
16	1.58
18	2.00
20	2.47
22	2.98
24	3.55
25	3.85

DETAIL OF THE EXTENSION OF EXISTING R.C. BOX CULVERT

Please see notes here

TYPICAL LONGITUDINAL SECTION OF CULVERT

DETAIL A
EXPANSION JOINT DETAIL

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

SLOPE = 6 : 1

S	H	W1	W2	X2
1.00	0.70	0.20	0.20	0.20
1.50	0.70	0.22	0.20	0.20
2.00	0.70	0.24	0.20	0.20
2.50	0.70	0.28	0.20	0.24
3.00	0.70	0.32	0.20	0.24
3.50	0.70	0.36	0.20	0.24

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 2 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	6	8	12	16	18	22

Slope = 3 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Slope = 4 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Note:

Outer Wing Wall Key in Slope 2 : 1 = W1 + 0.10
But for 3 : 1 & 4 : 1 = W1 + 0.20

Staion **37+836.740**

cell 3

RCBC **3 - 3.00 x 2.50**

R. C. B. C.

T1 = 0.36 W1 = 0.32
T2 = 0.32 W2 = 0.26
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2018.990
B.C. slope = -0.00856

Skew = 90 ° Normal
P.G.L. = 2026.677
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Staion 37+836.740 **skew 90° Normal**

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1=P2	No. of Pane	TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.50	10.16	20.000	2	40.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1=P2 20.000 m.	A	1.03 / 1.33	0.24	14	2.360	0.00	2.36	84 x 8 = 672	1585.920	1.21	1918.963
	B	4.59 / x=0.30	0.36	16	4.890	0	4.89	56 x 8 = 448	2190.720	1.58	3461.338
	C	5.62	0.18	14	5.62	0	5.62	112 x 4 = 448	2517.760	1.21	3046.490
	D	3.54	0.16	14	3.54	0	3.54	126 x 8 = 1008	3568.320	1.21	4317.667
	E	3.52	0.24	14	3.52	0	3.52	84 x 4 = 336	1182.720	1.21	1431.091
	F	x=0.25 / 3.06	0.36	14	3.56	0	3.56	56 x 4 = 224	797.440	1.21	964.902
	G	x=0.25 / 3.06	0.44	14	3.31	0	3.31	46 x 8 = 368	1218.080	1.21	1473.877
	LONG'NAL 40.000	12 / 29.580 / .l. = 60*dia.	VAR.	14	41.580	0	41.580	45+45+13*2+6*2= 256	########	1.21	#######

											SUB TOTAL =	29494.149

Staion 37+836.740 skew 90 Normal

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P3		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.50000	10.16	10.029		10.029

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P3 10.029 m.	A	1.03 1.33	0.24	14	2.360	0.00	2.36	42 x 4 = 168	396.480	1.21	479.741
	B	4.59 x=0.30	0.36	16	4.890	0	4.89	29 x 4 = 116	567.240	1.58	896.239
	C	5.62	0.18	14	5.62	0	5.62	56 x 2 = 112	629.440	1.21	761.622
	D	3.54	0.16	14	3.54	0	3.54	63 x 4 = 252	892.080	1.21	1079.417
	E	3.52	0.24	14	3.52	0	3.52	42 x 2 = 84	295.680	1.21	357.773
	F	x=0.25 3.06	0.36	14	3.56	0	3.56	29 x 2 = 58	206.480	1.21	249.841
	G	x=0.25 3.06	0.44	14	3.31	0	3.31	24 x 4 = 96	317.760	1.21	384.490
	LONG'NAL 10.029	0 9.929	VAR.	14	9.929	0	9.929	45+45+13*2+6*2= 128	1270.912	1.21	1537.804
										SUB TOTAL =	5746.926

Staion 37+836.740 skew 90 Normal TABLE 2

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIW	TBS	WC	TL	TTS	L	X	xs
3	3.00	2.50	0.32	0.26	0.36	0.200	0.60	0.32	4.204+24.735	10.16	10.160

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.347 0.24	0.3	12	1.373	0	1.373	35 x 4 = 140	192.267	0.888	170.733
	E101	10.080	-	22	10.080	0	10.080	10 x 2 = 20	201.60	2.980	600.768
	E102	10.080	-	14	10.080	0	10.080	2 x 2 = 4	40.32	1.21	48.787
	E103	0.120 0.34 0.24 0.15	0.2	12	1.000	0	1.000	51 x 2 = 102	102.00	0.888	90.576
	H301	10.080	-	24	10.080	0	10.080	4 x 2 = 8	80.640	3.550	286.272
	H302	0.320 0.467 0.33 0.320	0.15	14	1.437	0	1.437	68 x 2 = 136	195.390	1.210	236.422
	H300 *WALL*	0.800 dowel	0.3	16	0.800	0	0.800	9 x 8 = 72	57.60	1.580	91.008
	H300 *BOT.SLAB*	0.800 dowel	0.15	16	0.800	0	0.800	68 x 2 = 136	108.80	1.580	171.904
	WALL *EXP. JT.*	0.924 dowel	0.3	16	0.924	0	0.924	9 x 8 = 72	66.53	1.580	105.114
	Top & Bot. *EXP. JT.*	0.924 dowel	0.15	16	0.924	0	0.924	136 x 2 = 272	251.33	1.580	397.098
										SUB TOTAL =	**2198.682**

Staion **37+836.740** **skew** **90 °** **INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49027°		10.160	5.545

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	10.060	as	14	10.060	0.00	10.060	2 x 1 = 2	20.120	1.21	24.345
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	68 x 1 = 68	90.691	1.21	109.736
	A100	5.445	as	12	5.445	0	5.445	6 x 4 = 24	130.680	0.888	116.044
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	28 x 2 = 56	101.555	1.21	122.882
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	28 x 2 = 56	88.870	1.21	107.533
	F300 G300	5.445	0.15	12	5.445	0	5.445	61 x 2 = 122	664.290	0.888	589.890
	L4 F301	10.080 x=0.15	0.15	14	10.380	0	10.380	37 x 1 = 37	384.060	1.21	464.713
	L4 G301	10.080 x=0.15	0.15	12	10.380	0	10.380	37 x 1 = 37	384.060	0.888	341.045
									TOTAL FOR INLET APRON		**1876.187**

Staion 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	-0.49027°		10.160	5.545

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.047	as	12	6.047	0	6.047	2 x 4 = 8	48.374	0.888	42.956
	B101-18Ø	0.15 ave =2.437 0.38 max =2.894 min =1.979	0.15	18	2.967	0	2.967	13 x 2 = 26	77.13	2.000	154.258
	B101-14Ø	0.15 ave =1.032 0.38 max =1.904 min =0.160	0.15	14	1.562	0	1.562	24 x 2 = 48	74.97	1.210	90.711
	C101	0.15 ave =1.527 0.24 max =2.894 min =0.160	0.15	12	1.917	0	1.917	37 x 2 = 74	141.86	0.888	125.972
	D101-16Ø	0.15 ave =2.437 0.32 max =2.894 min =1.979	0.15	16	2.907	0	2.907	13 x 4 = 52	151.14	1.580	238.799
	D101-14Ø	0.15 ave =1.032 0.32 max =1.904 min =0.160	0.15	14	1.502	0	1.502	24 x 4 = 96	144.18	1.210	174.453
	A101	ave =2.743 max =5.159 min =0.328	0.15	12	2.743	0	2.743	17 x 8 = 136	373.105	0.888	331.317
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR INLET WING WALL		**1344.807**

Staion 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			10.160	5.545

TOE WALL (INLET)	A205	10.060	as	14	10.060	0	10.060	10 x 1 = 10	100.600	1.21	121.726
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	68 x 1 = 68	176.120	1.21	213.105
									TOTAL FOR INLET TOE WALL		**334.831**

Staion **37+836.740** **skew** **90 °** **OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49027°		10.160	5.738

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	10.060	as	14	10.060	0.00	10.060	2 x 1 = 2	20.120	1.21	24.345
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	68 x 1 = 68	90.691	1.21	109.736
	A100	5.638	as	12	5.638	0	5.638	6 x 4 = 24	135.312	0.888	120.157
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	29 x 2 = 58	105.182	1.21	127.270
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	29 x 2 = 58	92.044	1.21	111.373
	F300 G300	5.638	0.15	12	5.638	0	5.638	61 x 2 = 122	687.836	0.888	610.798
	L4 F301	10.080 x=0.15	0.15	14	10.380	0	10.380	39 x 1 = 39	404.820	1.21	489.832
	L4 G301	10.080 x=0.15	0.15	12	10.380	0	10.380	39 x 1 = 39	404.820	0.888	359.480
										TOTAL FOR OUTLET APRON	**1952.992**

Staion 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49027°		10.160	5.738

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.219	as	12	6.219	0	6.219	2 x 4 = 8	49.752	0.888	44.180
	B101-18Ø	0.15 ave =2.452 0.38 max =2.894 min =2.010	0.15	18	2.982	0	2.982	13 x 2 = 26	77.53	2.000	155.059
	B101-14Ø	0.15 ave =1.046 0.38 max =1.935 min =0.158	0.15	14	1.576	0	1.576	25 x 2 = 50	78.82	1.210	95.376
	C101	0.15 ave =1.526 0.24 max =2.894 min =0.158	0.15	12	1.916	0	1.916	38 x 2 = 76	145.64	0.888	129.325
	D101-16Ø	0.15 ave =2.452 0.32 max =2.894 min =2.010	0.15	16	2.922	0	2.922	13 x 4 = 52	151.94	1.580	240.064
	D101-14Ø	0.15 ave =1.046 0.32 max =1.935 min =0.158	0.15	14	1.516	0	1.516	25 x 4 = 100	151.65	1.210	183.493
	A101	ave =2.835 max =5.341 min =0.328	0.15	12	2.835	0	2.835	17 x 8 = 136	385.503	0.888	342.327
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR OUTLET WING WALL		**1376.163**

Staion 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			10.160	5.738
TOE WALL (OUTLET)	A205	10.060	as	14	10.060	0	10.060	20 x 1 = 20	201.200	1.21	243.452
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	68 x 1 = 68	312.120	1.21	377.665
									TOTAL FOR OUTLET TOE WALL		**621.117**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Staion 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60	50.029	10.160	10.160

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	170.733	4,520.408
E103		90.576	
W.W.		4,259.099	
A	14	2,398.704	33,405.909
C		3,808.112	
D		5,397.084	
E		1,788.864	
F		1,214.743	
G		1,858.366	
LONG'L		14,417.624	
E102		48.787	
H302		236.422	
W.W.		2,237.202	
B	16	4,357.577	5,688.021
H300		262.912	
E.J.		502.212	
W.W.		565.320	
W.W.	18	309.318	309.318
W.W.	20	135.158	135.158
E101	22	600.768	600.768
H301	24	286.272	286.272
	25	0.000	0.000
		TOTAL WEIGHT =	**44,945.854**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Staion 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60	50.029	10.160	10.160

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	162.654
BOTTOM SLAB	Vol. = Length * X * T1	182.986
OUTER WALLS	Vol. = Length * H * 2W1	80.046
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	65.038
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.203
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.914
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.375
	TOTAL VOLUME =	**492.216**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Staion 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNES S (T)	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	5.545	5.738	0.250	10.160	10.160

X2	SLOPE
0.29	2.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	14.084
APRON OUTLET	Vol. = Lo * X * T	14.575
TOE WALL INLET	Vol. = XS * T * (1-T)	1.905
TOE WALL OUTLET	Vol. = XS * T * (2-T)	4.445
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	3.915
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	4.047
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	4.066
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	4.207
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.545
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.567
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.536
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.558
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.077
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.077
	TOTAL VOLUME =	**55.604**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station 37 + 836.740

R. C. B. C.

RCBC	**3**	**3.00 x**	**2.50**		
T1 =	0.36	W1 =	0.32		
T2 =	0.32	W2 =	0.26	Skew =	60 ° Left
SSL =	2.000 =	2.3094		C.W. =	7.300
SSR =	2.000 =	2.3094		H/MED. =	2.000
Inner Shoulder =	2.000			Layer =	0.630
Outer Shoulder =	3.000				
Shoulder Slope =	4.000				
C.L. ELEV.=	2028.988				
CULV. SLP =	0.04000				

t =	0.630	xleft =	3.316
skew =	60	yleft =	0.829
slope =	0.25	xright =	2.032
rd. width =	14.300	yright =	0.508
half med=	2.000		

Station 37+836.740

		PGL	S.E.						
1	37846.910	2034.869	0.06	a	17.616	b	10.170	c	20.341
2	37+844.996	2035.02	0.06	a	14.300	b	8.256	c	16.512
3	37+837.895	2035.583		a	2.000	b	1.155	c	2.309
4	37+836.740	2035.674		a		b		c	
5	37+835.585	2035.766		a	2.000	b	1.155	c	2.309
6	37+828.484	2036.327	0.06	a	14.300	b	8.256	c	16.512
7	37+827.311	2036.42	0.06	a	16.332	b	9.429	c	18.859

Station 37 + 836.740 skew 60° Left

TABLE 2

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	BARREL LENGTH P1=P2	No. of Pane	TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.4330	10.16	20.000	2	40.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1=P2 20.000 m.	A	1.03 / 1.33	0.24	14	2.360	0.00	2.36	84 x 8 = 672	1585.920	1.21	1918.963
	B	4.59 / x=0.30	0.36	16	4.890	0	4.89	56 x 8 = 448	2190.720	1.58	3461.338
	C	5.62	0.18	14	5.62	0	5.62	112 x 4 = 448	2517.760	1.21	3046.490
	D	3.54	0.16	14	3.54	0	3.54	126 x 8 = 1008	3568.320	1.21	4317.667
	E	3.52	0.24	14	3.52	0	3.52	84 x 4 = 336	1182.720	1.21	1431.091
	F	x=0.25 / 3.06	0.36	14	3.56	0	3.56	56 x 4 = 224	797.440	1.21	964.902
	G	x=0.25 / 3.06	0.44	14	3.31	0	3.31	46 x 8 = 368	1218.080	1.21	1473.877
	LONG'NAL 40.000	12 / 29.580 o.l. = 60*dia.	VAR.	14	41.580	0	41.580	45+45+13*2+6*2= 256	10644.480	1.21	12879.821
										SUB TOTAL =	**29494.149**

Station **37 + 836.740** **skew** **60** **Left**

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P3=P4		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.43301	10.16	3.924		3.924

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P3=P4 3.924 m.	A	1.03 / 1.33	0.24	14	2.360	0.00	2.36	17 x 8 = 136	320.960	1.21	388.362
	B	4.59 / x=0.30	0.36	16	4.890	0	4.89	12 x 8 = 96	469.440	1.58	741.715
	C	5.62	0.18	14	5.62	0	5.62	22 x 4 = 88	494.560	1.21	598.418
	D	3.54	0.16	14	3.54	0	3.54	25 x 8 = 200	708.000	1.21	856.680
	E	3.52	0.24	14	3.52	0	3.52	17 x 4 = 68	239.360	1.21	289.626
	F	x=0.25 / 3.06	0.36	14	3.56	0	3.56	12 x 4 = 48	170.880	1.21	206.765
	G	x=0.25 / 3.06	0.44	14	3.31	0	3.31	10 x 8 = 80	264.800	1.21	320.408
	P3 to P10 Top Slab max= 9.653	0 / 6.749 min= 3.845	VAR.	14	6.749	0	6.749	45*2 = 90	607.389	1.21	734.941
	P3 to P10 Bot. Slab max= 9.653	0 / 6.749 min= 3.845	VAR.	14	6.749	0	6.749	45*2 = 90	607.389	1.21	734.941
	W.W. Short NF L= 3.845	0 / 3.845	VAR.	14	3.845	0	3.845	7*2 = 14	53.826	1.21	65.129
	W.W. Short FF L= 3.983	0 / 3.983	VAR.	14	3.983	0	3.983	6 *2 = 12	47.799	1.21	57.837
	W.W. Long FF L= 9.514	0 / 9.514	VAR.	14	9.514	0	9.514	6 *2 = 12	114.171	1.21	138.147
	W.W. Long NF L= 9.653	0 / 9.653	VAR.	14	9.653	0	9.653	7*2 = 14	135.139	1.21	163.519
	W.W. Inner Short L= 5.808	0 / 5.808	VAR.	14	5.808	0	5.808	6*2 = 12	69.692	1.21	84.328
	W.W. Inner Long L= 7.690	0 / 7.690	VAR.	14	7.690	0	7.690	6*2 = 12	92.278	1.21	111.656
										SUB TOTAL =	**5492.470**

Station **37 + 836.740** **skew** **60** **Left**

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P5=P8=		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.43301	10.16	1.992		1.992

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P5=P8= #### m.	A	1.03 1.33	0.24	14	2.360	0.00	2.36	8 x 4 = 32	75.520	1.21	91.379
	Avar	0.646 max=0.854 min= 0.439	0.24	14	0.646	0.00	0.65	2 x 4 = 8	5.172	1.21	6.258
	B	4.590 x=0.30	0.36	16	4.890	0	4.89	6 x 4 = 24	117.360	1.58	185.429
	Bvar.	2.493 max= 3.906 min= 1.080	0.36	16	2.493	0	2.493	6 x 4 = 24	59.837	1.58	94.543
	C	5.62	0.18	14	5.62	0	5.62	6 x 4 = 24	134.880	1.21	163.205
	C var	4.974 max=5.608 min= 4.340	0.18	14	5.608	0	5.608	5 x 4 = 20	112.152	1.21	135.704
	D	3.54	0.16	14	3.54	0	3.54	13 x 4 = 52	184.080	1.21	222.737
	Dvar	1.68 max= 3.203 min= 0.154	0.16	14	1.679	0	1.679	12 x 4 = 48	80.576	1.21	97.496
	E	3.52	0.24	14	3.52	0	3.52	7 x 4 = 28	98.560	1.21	119.258
	E var	3.498 max=3.706 min= 3.290	0.24	14	3.498	0	3.498	2 x 4 = 8	27.983	1.21	33.859
	F	x=0.25 3.06	0.36	14	3.56	0	3.56	6 x 2 = 12	42.720	1.21	51.691
	G	x=0.25 3.06	0.44	14	3.31	0	3.31	5 x 6 = 30	99.300	1.21	120.153
										SUB TOTAL =	**1321.712**

Station **37 + 836.740** **skew** **60** **Left**

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P6=P9=		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.43	10.16	1.882		1.882

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 4 - 4 P6=P9= 1.882 m.	A	1.03 / 1.33	0.24	14	2.360	0.00	2.36	8 x 4 = 32	75.520	1.21	91.379
	B	4.59 / x=0.30	0.36	16	4.890	0	4.89	4 x 4 = 16	78.240	1.58	123.619
	B	3.622 / x=0.30 / max=3.934 / min= 3.31	0.36	16	3.922	0	3.922	2 x 4 = 8	31.374	1.58	49.571
	Cvar.	2.554 / max=4.028 / min=1.080	0.18	14	2.554	0	2.554	11 x 4 = 44	112.381	1.21	135.981
	D	3.54	0.16	14	3.54	0	3.54	11 x 4 = 44	155.760	1.21	188.470
	D	3.31	0.16	14	3.31	0	3.31	1 x 4 = 4	13.240	1.21	16.020
	E	1.66 / max=2.874 / min=0.446	0.24	14	1.66	0	1.66	7 x 4 = 28	46.480	1.21	56.241
	F	x=0.25 / 3.06	0.36	14	3.56	0	3.56	6 x 2 = 12	42.720	1.21	51.691
	G	x=0.25 / 3.06	0.44	14	3.31	0	3.31	5 x 4 = 20	66.200	1.21	80.102
										SUB TOTAL =	**793.075**

Station **37 + 836.740** **skew** **60** **Left**

TABLE 2

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	BARREL LENGTH P7=P10=		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.43	10.16	1.992		1.992

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 5 - 5 P7=P10= 1.992 m.	A	1.03 1.33	0.24	14	2.360	0.00	2.36	4 x 4 = 16	37.760	1.21	45.690
	A	1.03 0.82 max=1.232 min = 0.40	0.24	14	1.846	0.00	1.85	3 x 4 = 12	22.150	1.21	26.801
	B	1.439 x=0.30 max=2.686 min=0.192	0.36	16	1.739	0	1.739	5 x 4 = 20	34.787	1.58	54.964
	D	1.647 max=3.033 min=0.262	0.16	14	1.647	0	1.647	11 x 4 = 44	72.478	1.21	87.698
	F	x=0.25 3.06	0.36	14	3.56	0	3.56	6 x 2 = 12	42.720	1.21	51.691
	G	x=0.25 3.06	0.44	14	3.31	0	3.31	5 x 2 = 10	33.100	1.21	40.051
										SUB TOTAL =	**306.896**

Station	37 + 836.740		skew	60		Left		TABLE 2			
CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIW	WC	TL		X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.231	0.65		10.16	11.732

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.439 0.24	0.3	12	1.558	0	1.558	35 x 4 = 140	218.060	0.888	193.637
	E101	11.639	-	22	11.639	0	11.639	10 x 2 = 20	232.79	2.980	693.706
	E102	11.639	-	14	11.639	0	11.639	2 x 2 = 4	46.56	1.21	56.335
	E103	0.174 0.34 0.24 0.15	0.2	12	1.054	0	1.054	51 x 2 = 102	107.54	0.888	95.493
	H301	11.639	-	24	11.639	0	11.639	4 x 2 = 8	93.115	3.550	330.558
	H302	0.370 0.467 0.33 0.370	0.15	14	1.536	0	1.536	68 x 2 = 136	208.855	1.210	252.714
	H300 *WALL*	0.924 dowel	0.3	16	0.924	0	0.924	9 x 8 = 72	66.51	1.580	105.087
	H300 *BOT.SLAB*	0.924 dowel	0.15	16	0.924	0	0.924	68 x 2 = 136	125.63	1.580	198.497
	WALL *EXP. JT.*	0.800 dowel	0.3	16	0.800	0	0.800	9 x 8 = 72	57.60	1.580	91.008
	Top & Bot. *EXP. JT.*	0.800 dowel	0.15	16	0.800	0	0.800	136 x 2 = 272	217.60	1.580	343.808
										SUB TOTAL =	**2360.844**

Station **37 + 836.740** **skew** **60 ° INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		10.160	5.962

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	11.616	as	14	11.616	0.00	11.616	2 x 1 = 2	23.233	1.21	28.111
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	68 x 1 = 68	107.992	1.21	130.671
	A100	5.847	as	12	5.847	0	5.847	6 x 4 = 24	140.317	0.888	124.601
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	30 x 2 = 60	116.052	1.21	140.422
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	30 x 2 = 60	103.703	1.21	125.481
	F300 G300	5.847	0.15	12	5.847	0	5.847	61 x 2 = 122	713.277	0.888	633.390
	L3 F301	ave =5.220 x=0.15 max =9.674 min =0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L3 G301	ave =5.220 x=0.15 max =9.674 min =0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L4 F301	10.080 x=0.15	0.2	12	10.380	0	10.380	1 x 1 = 1	10.380	0.888	9.217
	L4 G301	10.080 x=0.15	0.2	12	10.380	0	10.380	1 x 1 = 1	10.380	0.888	9.217
									TOTAL FOR INLET APRON		**1735.171**

Station 37 + 836.740 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	-2.29060°		10.160	5.962

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.420	as	12	6.420	0	6.420	2 x 4 = 8	51.362	0.888	45.610
	B101-18Ø	0.15 ave =2.478 0.38 max =2.903 min =2.052	0.15	18	3.008	0	3.008	13 x 2 = 26	78.20	2.000	156.393
	B101-14Ø	0.15 ave =1.072 0.38 max =1.987 min =0.158	0.15	14	1.602	0	1.602	27 x 2 = 54	86.53	1.210	104.707
	C101	0.15 ave =1.531 0.24 max =2.903 min =0.158	0.15	12	1.921	0	1.921	40 x 2 = 80	153.65	0.888	136.445
	D101-16Ø	0.15 ave =2.478 0.32 max =2.903 min =2.052	0.15	16	2.948	0	2.948	13 x 4 = 52	153.27	1.580	242.171
	D101-14Ø	0.15 ave =1.072 0.32 max =1.987 min =0.158	0.15	14	1.542	0	1.542	27 x 4 = 108	166.59	1.210	201.573
	A101	ave =2.977 max =5.560 min =0.395	0.15	12	2.977	0	2.977	17 x 8 = 136	404.915	0.888	359.564
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR INLET WING WALL		**1434.573**

Station 37 + 836.740 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.413°			10.160	5.962

TOE WALL (INLET)	A205	11.616	as	14	11.616	0	11.616	10 x 1 = 10	116.163	1.21	140.557
	A203	0.173 0.774 0.800 0.196	0.15	14	2.743	0	2.743	78 x 1 = 78	213.966	1.21	258.899
									TOTAL FOR INLET TOE WALL		**399.456**

Station **37 + 836.740** **skew** **60 ° OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		10.160	7.175

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	11.616	as	14	11.616	0.00	11.616	2 x 1 = 2	23.233	1.21	28.111
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	68 x 1 = 68	107.992	1.21	130.671
	A100	7.060	as	12	7.060	0	7.060	6 x 4 = 24	169.429	0.888	150.453
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	36 x 2 = 72	139.262	1.21	168.507
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	36 x 2 = 72	124.444	1.21	150.577
	F300 G300	7.060	0.15	12	7.060	0	7.060	61 x 2 = 122	861.263	0.888	764.801
	L3 F301	ave =5.220 x=0.15 max =9.674 min =0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L3 G301	ave =5.220 x=0.15 max =9.674 min =0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L4 F301	10.080 x=0.15	0.2	12	10.380	0	10.380	8 x 1 = 8	83.040	0.888	73.740
	L4 G301	10.080 x=0.15	0.2	12	10.380	0	10.380	8 x 1 = 8	83.040	0.888	73.740
									TOTAL FOR OUTLET APRON		**2074.659**

Station 37 + 836.740 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		10.160	7.175

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.533	as	12	7.533	0	7.533	2 x 4 = 8	60.262	0.888	53.513
	B101-18Ø	0.15 ave =2.550 0.38 max =2.903 min =2.196	0.15	18	3.080	0	3.080	13 x 2 = 26	80.07	2.000	160.137
	B101-14Ø	0.15 ave =1.141 0.38 max =2.131 min =0.151	0.15	14	1.671	0	1.671	35 x 2 = 70	116.96	1.210	141.524
	C101	0.15 ave =1.527 0.24 max =2.903 min =0.151	0.15	12	1.917	0	1.917	48 x 2 = 96	184.04	0.888	163.427
	D101-16Ø	0.15 ave =2.550 0.32 max =2.903 min =2.196	0.15	16	3.020	0	3.020	13 x 4 = 52	157.02	1.580	248.087
	D101-14Ø	0.15 ave =1.141 0.32 max =2.131 min =0.151	0.15	14	1.611	0	1.611	35 x 4 = 140	225.52	1.210	272.885
	A101	ave =3.551 max =6.707 min =0.395	0.15	12	3.551	0	3.551	17 x 8 = 136	482.942	0.888	428.853
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR OUTLET WING WALL		**1656.536**

Station 37 + 836.740 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.413°			10.160	7.175
TOE WALL (OUTLET)	A205	11.616	as	14	11.616	0	11.616	20 x 1 = 20	232.325	1.21	281.114
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	78 x 1 = 78	369.966	1.21	447.659
									TOTAL FOR OUTLET TOE WALL		**728.772**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 37 + 836.740 **skew** 60° **Left**

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.23	0.65	53.713	10.160	11.732

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	193.637	4,538.426
E103		95.493	
W.W.		4,249.295	
A	14	2,568.832	35,757.639
C		4,079.797	
D		5,786.768	
E		1,930.074	
F		1,326.741	
G		2,034.591	
LONG'L		14,970.318	
E102		56.335	
H302		252.714	
W.W.		2,751.468	
B	16	4,711.179	6,026.295
H300		303.584	
E.J.		434.816	
W.W.		576.716	
W.W.	18	316.530	316.530
W.W.	20	135.158	135.158
E101	22	693.706	693.706
H301	24	330.558	330.558
	25	0.000	0.000
		TOTAL WEIGHT =	**47,798.312**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37 + 836.740 skew 60° Left

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.231	0.65	53.713	10.160	11.732

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	174.632
BOTTOM SLAB	Vol. = Length * X * T1	196.461
OUTER WALLS	Vol. = Length * H * 2W1	85.941
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	69.827
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.235
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	1.056
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.403
	TOTAL VOLUME =	**528.555**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37 + 836.740 skew 60° Left

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	5.962	7.175	0.250	10.160	11.732

X2	SLOPE
0.29	2.309 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	15.143
APRON OUTLET	Vol. = Lo * X * T	18.225
TOE WALL INLET	Vol. = XS * T * (1-T)	2.200
TOE WALL OUTLET	Vol. = XS * T * (2-T)	5.133
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	4.204
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	5.038
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	4.371
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	5.261
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.593
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.731
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.583
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.718
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.244
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.244
	TOTAL VOLUME =	**64.688**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station **37+836.746**

RCBC **3 - 3.00 x 2.50**

R. C. B. C.

T1 = 0.36 W1 = 0.32
T2 = 0.32 W2 = 0.26
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2023.000
B.C. slope = 0.00855

Skew = 90 ° Normal
P.G.L. = 2026.677
SL = 0.029853 SR = 0.031966
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station 37+836.746 **Skew = 90 ° Normal**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD SLOPE	NON-STANDARD X	BARREL LENGTH P1	BARREL LENGTH No. of Pane	BARREL LENGTH TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.50	10.16	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	1	2.37 / 3.08 / 2.37	0.15	20	7.82	0	7.82	134 x 2 = 268	2095.76	2.47	5176.527
	2	x=0.24 / 4.00	0.15	20	4.48	0	4.48	134 x 2 = 268	1200.64	2.47	2965.581
	3	3.40 / x=0.28	0.15	16	3.96	0	3.96	134 x 2 = 268	1061.280	1.58	1676.822
	4	3.08 / x=0.25	0.15	12	3.58	0	3.58	134 x 2 = 268	959.44	0.888	851.983
	Top SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	51 x 1 = 51	1051.620	0.888	933.839
	WALLS 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	14 x 8 = 112	2309.440	0.888	2050.783
	BOT SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	51 x 2 = 102	2103.240	0.888	1867.677
	TOP SLAB 6 20.000	12 / 8.740 / O.L.=60*Ø	0.20	14	20.740	0	20.740	51 x 1 = 51	1057.740	1.210	1279.865
	7	7.720	0.15	20	7.720	0	7.720	134 x 1 = 134	1034.480	2.470	2555.166
	8	7.720	0.15	20	7.720	0	7.720	134 x 1 = 134	1034.480	2.470	2555.166
	9	3.08 / x=0.40	0.15	16	3.880	0	3.880	134 x 4 = 536	2079.680	1.580	3285.894
	10	4.460	0.15	20	4.460	0	4.460	134 x 1 = 134	597.640	2.470	1476.171
	11	3.980	0.15	12	3.980	0	3.980	134 x 1 = 134	533.320	0.888	473.588
										SUB TOTAL =	**27149.061**

Station 37+836.746 **Skew = 90** **Normal**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P2		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26		10.16	14.6200		14.6200

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 14.620 m.	1	2.37 3.03 2.37	0.15	20	7.82	0	7.82	98 x 2 = 196	1532.72	2.47	3785.818
	2	x=0.24 4.00	0.15	20	4.48	0	4.48	98 x 2 = 196	878.08	2.47	2168.858
	3	3.40 x=0.28	0.15	16	3.96	0	3.96	98 x 2 = 196	776.160	1.58	1226.333
	4	3.08 x=0.25	0.15	12	3.58	0	3.58	98 x 2 = 196	701.68	0.888	623.092
	Top SLAB 5 14.620	12 3.240 O.L.=60*Ø	0.20	12	15.240	0	15.240	51 x 1 = 51	777.240	0.888	690.189
	WALLS 5 14.620	12 3.240 O.L.=60*Ø	0.20	12	15.240	0	15.240	51 x 2 = 102	1554.480	0.888	1380.378
	BOT SLAB 5 14.620	12 3.240 O.L.=60*Ø	0.20	12	15.240	0	15.240	14 x 4 = 56	853.440	0.888	757.855
	TOP SLAB 6 14.620	12 3.360 O.L.=60*Ø	0.20	14	15.360	0	15.360	51 x 1 = 51	783.360	1.210	947.866
	7	7.720	0.15	20	7.720	0	7.720	98 x 1 = 98	756.560	2.470	1868.703
	8	7.720	0.15	20	7.720	0	7.720	98 x 1 = 98	756.560	2.470	1868.703
	9	3.08 x=0.40	0.15	16	3.880	0	3.880	98 x 4 = 392	1520.960	1.580	2403.117
	10	4.460	0.15	20	4.460	0	4.460	98 x 1 = 98	437.080	2.470	1079.588
	11	3.980	0.15	12	3.980	0	3.980	98 x 1 = 98	390.040	0.888	346.356
										SUB TOTAL =	**19146.855**

Station 37+836.746 Skew = 90 Normal NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIW	WC	TL		X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60		10.16	10.160

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.347 0.24	0.3	12	1.373	0	1.373	35 x 4 = 140	192.267	0.888	170.733
	E101	10.080	-	22	10.080	0	10.080	10 x 2 = 20	201.60	2.980	600.768
	E102	10.080	-	14	10.080	0	10.080	2 x 2 = 4	40.32	1.21	48.787
	E103	0.120 0.34 0.24 0.15	0.2	12	1.000	0	1.000	51 x 2 = 102	102.00	0.888	90.576
	H301	10.080	-	24	10.080	0	10.080	4 x 2 = 8	80.640	3.550	286.272
	H302	0.320 0.467 0.33 0.320	0.15	14	1.437	0	1.437	68 x 2 = 136	195.390	1.210	236.422
	H300 *WALL*	0.800 dowel	0.3	16	0.800	0	0.800	9 x 8 = 72	57.60	1.580	91.008
	H300 *BOT.SLAB*	0.800 dowel	0.15	16	0.800	0	0.800	68 x 2 = 136	108.80	1.580	171.904
	WALL *EXP. JT.*	0.924 dowel	0.3	16	0.924	0	0.924	9 x 4 = 36	33.26	1.580	52.557
	Top & Bot. *EXP. JT.*	0.924 dowel	0.15	16	0.924	0	0.924	136 x 1 = 136	125.66	1.580	198.549
										SUB TOTAL =	**1947.576**

Station **37+836.746** **skew** **90 °** **INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		10.160	5.545

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	10.060	as	14	10.060	0.00	10.060	2 x 1 = 2	20.120	1.21	24.345
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	68 x 1 = 68	90.691	1.21	109.736
	A100	5.445	as	12	5.445	0	5.445	6 x 4 = 24	130.680	0.888	116.044
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	28 x 2 = 56	101.555	1.21	122.882
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	28 x 2 = 56	88.870	1.21	107.533
	F300 G300	5.445	0.15	12	5.445	0	5.445	61 x 2 = 122	664.290	0.888	589.890
	L4 F301	10.080 x=0.15	0.15	14	10.380	0	10.380	37 x 1 = 37	384.060	1.21	464.713
	L4 G301	10.080 x=0.15	0.15	12	10.380	0	10.380	37 x 1 = 37	384.060	0.888	341.045
									TOTAL FOR INLET APRON		**1876.187**

Station 37+836.746 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		10.160	5.545

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.047	as	12	6.047	0	6.047	2 x 4 = 8	48.374	0.888	42.956
	B101-18Ø	0.15 ave =2.452 0.38 max =2.894 min =2.010	0.15	18	2.982	0	2.982	13 x 2 = 26	77.53	2.000	155.059
	B101-14Ø	0.15 ave =1.046 0.38 max =1.935 min =0.158	0.15	14	1.576	0	1.576	24 x 2 = 48	75.67	1.210	91.561
	C101	0.15 ave =1.526 0.24 max =2.894 min =0.158	0.15	12	1.916	0	1.916	37 x 2 = 74	141.80	0.888	125.922
	D101-16Ø	0.15 ave =2.452 0.32 max =2.894 min =2.010	0.15	16	2.922	0	2.922	13 x 4 = 52	151.94	1.580	240.064
	D101-14Ø	0.15 ave =1.046 0.32 max =1.935 min =0.158	0.15	14	1.516	0	1.516	24 x 4 = 96	145.58	1.210	176.153
	A101	ave =2.738 max =5.148 min =0.328	0.15	12	2.738	0	2.738	17 x 8 = 136	372.379	0.888	330.673
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR INLET WING WALL		**1348.726**

Station 37+836.746 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.565 °			10.160	5.545
TOE WALL (INLET)	A205	10.060	as	14	10.060	0	10.060	10 x 1 = 10	100.600	1.21	121.726
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	68 x 1 = 68	176.120	1.21	213.105
									TOTAL FOR INLET TOE WALL		**334.831**

NON-NORM

Station **37+836.746** **skew** **90 °** **OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		10.160	5.738

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	10.060	as	14	10.060	0.00	10.060	2 x 1 = 2	20.120	1.21	24.345
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	68 x 1 = 68	90.691	1.21	109.736
	A100	5.638	as	12	5.638	0	5.638	6 x 4 = 24	135.312	0.888	120.157
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	29 x 2 = 58	105.182	1.21	127.270
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	29 x 2 = 58	92.044	1.21	111.373
	F300 G300	5.638	0.15	12	5.638	0	5.638	61 x 2 = 122	687.836	0.888	610.798
	L4 F301	10.080 x=0.15	0.15	14	10.380	0	10.380	39 x 1 = 39	404.820	1.21	489.832
	L4 G301	10.080 x=0.15	0.15	12	10.380	0	10.380	39 x 1 = 39	404.820	0.888	359.480
									TOTAL FOR OUTLET APRON		**1952.992**

Station 37+836.746 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		10.160	5.738

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.219	as	12	6.219	0	6.219	2 x 4 = 8	49.752	0.888	44.180
	B101-18Ø	0.15 ave =2.452 0.38 max =2.894 min =2.010	0.15	18	2.982	0	2.982	13 x 2 = 26	77.53	2.000	155.059
	B101-14Ø	0.15 ave =1.046 0.38 max =1.935 min =0.158	0.15	14	1.576	0	1.576	25 x 2 = 50	78.82	1.210	95.376
	C101	0.15 ave =1.526 0.24 max =2.894 min =0.158	0.15	12	1.916	0	1.916	38 x 2 = 76	145.64	0.888	129.325
	D101-16Ø	0.15 ave =2.452 0.32 max =2.894 min =2.010	0.15	16	2.922	0	2.922	13 x 4 = 52	151.94	1.580	240.064
	D101-14Ø	0.15 ave =1.046 0.32 max =1.935 min =0.158	0.15	14	1.516	0	1.516	25 x 4 = 100	151.60	1.210	183.436
	A101	ave =2.835 max =5.341 min =0.328	0.15	12	2.835	0	2.835	17 x 8 = 136	385.504	0.888	342.327
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR OUTLET WING WALL		**1376.106**

Station 37+836.746 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			10.160	5.738
TOE WALL (OUTLET)	A205	10.060	as	14	10.060	0	10.060	20 x 1 = 20	201.200	1.21	243.452
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	68 x 1 = 68	312.120	1.21	377.665
									TOTAL FOR OUTLET TOE WALL		**621.117**

NON-NORM

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **50201 REINFORCING STEEL (Grade 60)** Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 37+836.746 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.20	0.60	34.620	10.160	10.160

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
04	12	1,475.075	14,495.451
05		7,680.720	
11		819.944	
S100		170.733	
E103		90.576	
W.W.		4,258.404	
06	14	2,227.731	4,752.634
E102		48.787	
H302		236.422	
W.W.		2,239.694	
03	16	2,903.155	9,672.770
09		5,689.011	
H300		262.912	
E.J.		251.106	
W.W.		566.585	
W.W.	18	310.118	310.118
01	20	8,962.346	25,635.438
02		5,134.438	
07		4,423.869	
08		4,423.869	
10		2,555.758	
W.W.		135.158	
E101	22	600.768	600.768
H301	24	286.272	286.272
	25	0.000	0.000
		TOTAL WEIGHT =	**55,753.452**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37+836.746 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60	34.620	10.160	10.160

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	112.557
BOTTOM SLAB	Vol. = Length * X * T1	126.626
OUTER WALLS	Vol. = Length * H * 2W1	55.392
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	45.006
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.203
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.914
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.260
	TOTAL VOLUME =	**340.958**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37+836.746 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	5.545	5.738	0.250	10.160	10.160

X2	SLOPE
0.29	2.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	14.084
APRON OUTLET	Vol. = Lo * X * T	14.575
TOE WALL INLET	Vol. = XS * T * (1-T)	1.905
TOE WALL OUTLET	Vol. = XS * T * (2-T)	4.445
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	3.915
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	4.047
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	4.066
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	4.207
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.545
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.567
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.536
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.558
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.077
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.077
	TOTAL VOLUME =	**55.604**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station 44 + 298.920

R. C. B. C.

RCBC	**3**	**3.00 x**	**2.50**
T1 =	0.36	W1 =	0.32
T2 =	0.32	W2 =	0.26
SSL =	2.000 =	2.3094	
SSR =	2.000 =	2.3094	
Inner Shoulder =	2.000		
Outer Shoulder =	3.000		
Shoulder Slope =	4.000		
C.L. ELEV.=	2023.123		
CULV. SLP =	0.04000		

Skew =	60 °	Left	
C.W. =	7.300		
H/MED. =	2.000		
Layer =	0.630		

t =	0.630	xleft =	2.921
skew =	60	yleft =	0.727
slope =	0.25	xright =	2.203
rd. width =	14.300	yright =	0.551
half med=	2.000		

Station 44+298.920

		PGL	S.E.						
1	44308.863	2026.675	0.03324079	a	17.221	b	9.943	c	19.885
2	44+307.176	2026.674	0.0343451	a	14.300	b	8.256	c	16.512
3	44+300.075	2026.676		a	2.000	b	1.155	c	2.309
4	44+298.920	2026.677		a		b		c	
5	44+297.765	2026.678		a	2.000	b	1.155	c	2.309
6	44+290.664	2026.689	0.036	a	14.300	b	8.256	c	16.512
7	44+289.392	2026.691	0.036	a	16.503	b	9.528	c	19.056

Station 44 + 298.920 Skew = 60 ° Left

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD SLOPE	NON-STANDARD X	BARREL LENGTH P1	No. of Pane	TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.43	10.16	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	1	2.37 / 3.08 / 2.37	0.15	20	7.82	0	7.82	134 x 2 = 268	2095.76	2.47	5176.527
	2	x=0.24 / 4.00	0.15	20	4.24	0	4.24	134 x 2 = 268	1136.32	2.47	2806.710
	3	3.88 / x=0.28	0.15	16	4.16	0	4.16	134 x 2 = 268	1114.880	1.58	1761.510
	4	3.08 / x=0.25	0.15	12	3.58	0	3.58	134 x 2 = 268	959.44	0.888	851.983
	Top SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	51 x 1 = 51	1051.620	0.888	933.839
	WALLS 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	14 x 8 = 112	2309.440	0.888	2050.783
	BOT SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	51 x 2 = 102	2103.240	0.888	1867.677
	TOP SLAB 6 20.000	12 / 8.740 / O.L.=60*Ø	0.20	14	20.740	0	20.740	51 x 1 = 51	1057.740	1.210	1279.865
	7	7.720	0.15	20	7.720	0	7.720	134 x 1 = 134	1034.480	2.470	2555.166
	8	7.720	0.15	20	7.720	0	7.720	134 x 1 = 134	1034.480	2.470	2555.166
	9	3.08 / x=0.40	0.15	16	3.880	0	3.880	134 x 4 = 536	2079.680	1.580	3285.894
	10	4.460	0.15	20	4.460	0	4.460	134 x 1 = 134	597.640	2.470	1476.171
	11	3.980	0.15	12	3.980	0	3.980	134 x 1 = 134	533.320	0.888	473.588
								NON SKEW		**SUB TOTAL =**	**27074.879**

Station **44 + 298.920** **Skew =** **60** **Left**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P2=P3		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26		10.16	6.9066		6.9066

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2=P3 6.907 m.	1	2.37 3.08 2.37	0.15	20	7.82	0	7.82	46 x 4 = 184	1438.88	2.47	3554.034
	2	x=0.24 4.00	0.15	20	4.24	0	4.24	46 x 4 = 184	780.16	2.47	1926.995
	3	3.88 x=0.28	0.15	16	4.16	0	4.16	46 x 4 = 184	765.440	1.58	1209.395
	4	3.08 x=0.25	0.15	12	3.58	0	3.58	46 x 4 = 184	658.72	0.888	584.943
	Top SLAB 5 12.635	10.08 max= 13.355 min= 6.799	0.2	12	10.077	0	10.077	51 x 2 = 102	1027.866	0.888	912.745
	Bot. SLAB 5 12.635	10.09 max= 13.355 min= 6.828	0.2	12	10.092	0	10.092	51 x 4 = 204	2058.677	0.888	1828.105
	EXT.WALL Short NF L= 6.828	0 6.828	0.20	12	6.828	0	6.828	14 x 2 28	191.176	0.888	169.764
	EXT.WALL Short FF L= 6.966	0 6.966	0.20	12	6.966	0	6.966	14 x 2 28	195.056	0.888	173.209
	EXT.WALL Long FF L= 13.217	12 1.217	0.20	12	13.217	0	13.217	14 x 2 28	370.083	0.888	328.634
	EXT.WALL Long NF L= 13.356	12 1.356	0.20	12	13.356	0	13.356	14 x 2 28	373.963	0.888	332.079
	INN..WALL SR-Short L= 8.733	0 8.733	0.20	12	8.733	0	8.733	14 x 2 28	244.523	0.888	217.136
	INN..WALL SR-Long L= 8.848	0 8.848	0.20	12	8.848	0	8.848	14 x 2 28	247.756	0.888	220.007
	INN..WALL LR-Short L= 10.615	0 10.615	0.20	12	10.615	0	10.615	14 x 2 28	297.223	0.888	263.934
	INN..WALL LR-Long L= 10.731	0 10.731	0.20	12	10.731	0	10.731	14 x 2 28	300.456	0.888	266.805
	Top SLAB 6 12.635	10.14 max= 13.475 min= 6.799	0.2	14	10.137	0	10.137	51 x 2 = 102	1033.986	1.210	1251.123
	7	7.720	0.15	20	7.720	0	7.720	46 x 2 = 92	710.240	2.470	1754.293
	8	7.720	0.15	20	7.720	0	7.720	46 x 2 = 92	710.240	2.470	1754.293
	9	3.08 x=0.40	0.15	16	3.880	0	3.880	46 x 8 = 368	1427.840	1.580	2255.987
	10	4.460	0.15	20	4.460	0	4.460	46 x 2 = 92	410.320	2.470	1013.490
	11	3.980	0.15	12	3.980	0	3.980	46 x 2 = 92	366.160	0.888	325.150
										SUB TOTAL =	**20342.123**

Station **44 + 298.920** **Skew =** **60** **Left**

							NON-STANDARD		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL		X	P4=P7		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26		10.16	1.992		1.992

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P4=P7 1.992 m.	1	2.37 3.08 2.37	0.15	20	7.820	0	7.820	13 x 2 = 26	203.32	2.47	502.200
	2	x=0.24 3.53	0.15	20	3.770	0	3.770	13 x 2 = 26	98.02	2.47	242.109
	2var.	x=0.24 1.755 max = 3.22 min = 0.29	0.15	20	1.995	0	1.995	12 x 2 = 24	47.880	2.47	118.264
	3	3.53 x=0.28	0.15	16	3.810	0	3.810	13 x 2 = 26	99.060	1.58	156.515
	3var	2.015 0.38 0.25 0.370 0.537 max =3.220 min =0.809	0.15	16	3.552	0	3.552	10 x 2 = 20	71.034	1.58	112.234
	3	0.55 0.38 0.370 0.255	0.15	16	1.554	0	1.554	1 x 2 = 2	3.108	1.58	4.910
	3	0.29 0.38 0.290	0.15	16	0.960	0	0.960	1 x 2 = 2	1.919	1.58	3.032
	4	3.08 x=0.25	0.15	12	3.580	0	3.580	13 x 4 = 52	186.16	0.888	165.310
	7	4.460	0.15	20	4.460	0	4.460	13 x 2 = 26	115.960	2.470	286.421
	7 var	3.725 max = 5.32 min = 2.13	0.15	20	3.725	0	3.725	13 x 2 = 26	96.852	2.470	239.226
	8	4.460	0.15	20	4.460	0	4.460	13 x 2 = 26	115.960	2.470	286.421
	8 var	3.725 max = 5.32 min = 2.13	0.15	20	3.725	0	3.725	13 x 2 = 26	96.852	2.470	239.226
	9	3.08 x=0.40	0.15	16	3.880	0	3.880	13 x 8 = 104	403.520	1.580	637.562
	10	3.520	0.15	20	3.520	0	3.520	13 x 2 = 26	91.520	2.470	226.054
	11	3.520	0.15	12	3.520	0	3.520	13 x 2 = 26	91.520	0.888	81.270
										SUB TOTAL =	**3300.754**

Station **44 + 298.920** **Skew =** **60** **Left**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P5 = P8		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26		10.16	1.882		1.882

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 4 - 4 P5 = P8 1.882 m.	1	2.37 3.08 2.37	0.15	20	7.820	0	7.820	13 x 2 = 26	203.320	2.47	502.200
	2	x=0.24 3.53	0.15	20	3.770	0	3.770	13 x 2 = 26	98.020	2.47	242.109
	2var.	x=0.24 1.755 max = 3.22 min = 0.29	0.15	20	1.995	0	1.995	12 x 2 = 24	47.880	2.47	118.264
	3	3.53 x=0.28	0.15	16	3.810	0	3.810	13 x 2 = 26	99.060	1.58	156.515
	3var.	2.015 0.38 0.25 0.370 0.537 max = 3.22 min = 0.81	0.15	16	3.552	0	3.552	11 x 2 = 22	78.138	1.58	123.458
	3	0.55 0.38 0.370 0.255	0.15	16	1.554	0	1.554	1 x 2 = 2	3.108	1.58	4.910
	3	0.29 0.38 0.290	0.15	16	0.960	0	0.960	1 x 2 = 2	1.919	1.58	3.032
	4	3.08 x=0.25	0.15	12	3.58	0	3.58	13 x 2 = 26	93.08	0.888	82.655
	7 var	3.725 max = 5.32 min = 2.13	0.15	20	3.725	0	3.725	13 x 2 = 26	96.852	2.470	239.226
	8 var	3.725 max =5.320 min =2.130	0.15	16	3.725	0	3.725	13 x 2 = 26	96.852	1.580	153.027
	9	3.08 x=0.40	0.15	16	3.880	0	3.880	5 x 4 = 20	77.600	1.580	122.608
										SUB TOTAL =	**1748.004**

Station 44 + 298.920 Skew = 60 Left

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P6 = P9		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26		10.16	1.992		1.9918

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 5 - 5 P6 = P9 1.992 m.	1 up	1.611 2.12 0.24 max = 3.04 min =0.182	0.15	20	3.971	0	3.971	12 x 2 = 24	95.31	2.47	235.415
	1 down	2.16 1.611 max = 3.04 min =0.182	0.15	20	3.771	0	3.771	12 x 2 = 24	90.51	2.47	223.559
	2 var	x=0.24 1.611 max = 3.04 min =0.182	0.15	20	2.091	0	2.091	12 x 2 = 24	50.190	2.47	123.969
	3 var	1.871 0.28 0.38 0.25 0.370 0.537 max = 3.04 min =0.702	0.15	16	3.688	0	3.688	10 x 2 = 20	73.759	1.58	116.539
	3	0.442 0.28 0.38 0.370 0.103	0.15	16	1.574	0	1.574	1 x 2 = 2	3.149	1.58	4.975
	3	0.182 0.28 0.38 0.182	0.15	16	1.025	0	1.025	1 x 2 = 2	2.049	1.58	3.238
	4	3.08 x=0.25	0.15	12	3.58	0	3.58	12 x 2 = 24	85.92	0.888	76.297
										SUB TOTAL =	**783.992**

Station **44 + 298.920** **Skew =** **60** Left

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS		X	xs
3	3.00	2.50	0.32	0.26	0.36	0.231	0.85	0.32		10.160	11.732

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	B01	11.616	-	25	11.616	0	11.616	10 x 2 = 20	232.33	2.000	464.652
	B02	0.770 0.24	0.2	12	2.220	0	2.220	51 x 2 = 102	226.440	0.888	201.079
	B03	0.154 0.24	0.2	10	0.988	0	0.988	51 x 4 = 204	201.552	0.617	124.358
	B04	11.616	-	22	11.616	0	11.616	6 x 2 = 12	139.396	1.210	168.669
	Y12	11.616	-	12	11.616	0	11.616	2 x 2 = 4	46.47	0.888	41.261
	Y12-200	0.165 0.34 0.24 0.15	0.2	12	1.045	0	1.045	51 x 2 = 102	106.57	0.888	94.630
	H300 *WALL*	0.924 dowel	0.3	16	0.924	0	0.924	9 x 8 = 72	66.51	1.580	105.087
	H300 *BOT.SLAB*	0.924 dowel	0.15	16	0.924	0	0.924	68 x 2 = 136	125.63	1.580	198.497
	WALL *EXP. JT.*	0.80 dowel	0.3	16	0.800	0	0.800	9 x 8 = 72	57.60	1.580	91.008
	Top & Bot. *EXP. JT.*	0.80 dowel	0.15	16	0.800	0	0.800	136 x 2 = 272	217.60	1.580	343.808
										SUB TOTAL =	**1833.048**

Station **44 + 298.920** **skew** **60 ° INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		10.160	5.962

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	11.616	as	14	11.616	0.00	11.616	2 x 1 = 2	23.233	1.21	28.111
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	68 x 1 = 68	107.992	1.21	130.671
	A100	5.847	as	12	5.847	0	5.847	6 x 4 = 24	140.317	0.888	124.601
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	30 x 2 = 60	116.052	1.21	140.422
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	30 x 2 = 60	103.703	1.21	125.481
	F300 G300	5.847	0.15	12	5.847	0	5.847	61 x 2 = 122	713.277	0.888	633.390
	L3 F301	ave =5.220 x=0.15 max =9.674 min =0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L3 G301	ave =5.220 x=0.15 max =9.674 min =0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L4 F301	10.080 x=0.15	0.2	12	10.380	0	10.380	1 x 1 = 1	10.380	0.888	9.217
	L4 G301	10.080 x=0.15	0.2	12	10.380	0	10.380	1 x 1 = 1	10.380	0.888	9.217
									TOTAL FOR INLET APRON		**1735.171**

Station **44 + 298.920** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	-2.29060°		10.160	5.962

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.420	as	12	6.420	0	6.420	2 x 4 = 8	51.362	0.888	45.610
	B101-18Ø	0.15 ave =2.478 0.38 max =2.903 min =2.052	0.15	18	3.008	0	3.008	13 x 2 = 26	78.20	2.000	156.393
	B101-14Ø	0.15 ave =1.072 0.38 max =1.987 min =0.158	0.15	14	1.602	0	1.602	27 x 2 = 54	86.53	1.210	104.707
	C101	0.15 ave =1.531 0.24 max =2.903 min =0.158	0.15	12	1.921	0	1.921	40 x 2 = 80	153.65	0.888	136.445
	D101-16Ø	0.15 ave =2.478 0.32 max =2.903 min =2.052	0.15	16	2.948	0	2.948	13 x 4 = 52	153.27	1.580	242.171
	D101-14Ø	0.15 ave =1.072 0.32 max =1.987 min =0.158	0.15	14	1.542	0	1.542	27 x 4 = 108	166.59	1.210	201.573
	A101	ave =2.977 max =5.560 min =0.395	0.15	12	2.977	0	2.977	17 x 8 = 136	404.915	0.888	359.564
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR INLET WING WALL		**1434.573**

Station **44 + 298.920** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.413°			10.160	5.962
TOE WALL (INLET)	A205	11.616	as	14	11.616	0	11.616	10 x 1 = 10	116.163	1.21	140.557
	A203	0.173 0.774 0.800 0.196	0.15	14	2.743	0	2.743	78 x 1 = 78	213.966	1.21	258.899
									TOTAL FOR INLET TOE WALL		**399.456**

Station **44 + 298.920** **skew** **60 ° OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		10.160	7.175

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	11.616	as	14	11.616	0.00	11.616	2 x 1 = 2	23.233	1.21	28.111
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	68 x 1 = 68	107.992	1.21	130.671
	A100	7.060	as	12	7.060	0	7.060	6 x 4 = 24	169.429	0.888	150.453
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	36 x 2 = 72	139.262	1.21	168.507
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	36 x 2 = 72	124.444	1.21	150.577
	F300 G300	7.060	0.15	12	7.060	0	7.060	61 x 2 = 122	861.263	0.888	764.801
	L3 F301	ave =5.220 x=0.15 max =9.674 min =0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L3 G301	ave =5.220 x=0.15 max =9.674 min =0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L4 F301	10.080 x=0.15	0.2	12	10.380	0	10.380	8 x 1 = 8	83.040	0.888	73.740
	L4 G301	10.080 x=0.15	0.2	12	10.380	0	10.380	8 x 1 = 8	83.040	0.888	73.740
									TOTAL FOR OUTLET APRON		**2074.659**

Station 44 + 298.920 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		10.160	7.175

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.533	as	12	7.533	0	7.533	2 x 4 = 8	60.262	0.888	53.513
	B101-18Ø	0.15 ave =2.550 0.38 max =2.903 min =2.196	0.15	18	3.080	0	3.080	13 x 2 = 26	80.07	2.000	160.137
	B101-14Ø	0.15 ave =1.141 0.38 max =2.131 min =0.151	0.15	14	1.671	0	1.671	35 x 2 = 70	116.96	1.210	141.524
	C101	0.15 ave =1.527 0.24 max =2.903 min =0.151	0.15	12	1.917	0	1.917	48 x 2 = 96	184.04	0.888	163.427
	D101-16Ø	0.15 ave =2.550 0.32 max =2.903 min =2.196	0.15	16	3.020	0	3.020	13 x 4 = 52	157.02	1.580	248.087
	D101-14Ø	0.15 ave =1.141 0.32 max =2.131 min =0.151	0.15	14	1.611	0	1.611	35 x 4 = 140	225.52	1.210	272.885
	A101	ave =3.551 max =6.707 min =0.395	0.15	12	3.551	0	3.551	17 x 8 = 136	482.942	0.888	428.853
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12o	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840 Skew	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR OUTLET WING WALL		**1656.536**

Station 44 + 298.920 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.413 o			10.160	7.175
TOE WALL (OUTLET)	A205	11.616	as	14	11.616	0	11.616	20 x 1 = 20	232.325	1.21	281.114
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	78 x 1 = 78	369.966	1.21	447.659
									TOTAL FOR OUTLET TOE WALL		**728.772**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 44 + 298.920 **skew** 60° **Left**

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.231	0.85	39.679	10.160	11.732

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
BO3	10	124.358	124.358
04	12	1,761.188	16,669.374
05		9,441.913	
11		880.008	
B02		201.079	
Y12		135.891	
W.W		4,249.295	
06	14	2,530.989	5,282.457
W.W		2,751.468	
03	16	3,660.264	11,277.431
09		6,302.051	
H300		303.584	
E.J.		434.816	
W.W		576.716	
W.W	18	316.530	316.530
01	20	10,193.936	28,685.693
02		5,578.420	
07		5,074.331	
08		4,988.132	
10		2,715.716	
W.W		135.158	
B04	22	168.669	168.669
	24	0.000	0.000
B01	25	464.652	464.652
		TOTAL WEIGHT =	**62,989.162**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 44 + 298.920 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.231	0.85	39.679	10.160	11.732

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	129.004
BOTTOM SLAB	Vol. = Length * X * T1	145.130
OUTER WALLS	Vol. = Length * H * 2W1	63.486
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	51.583
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.235
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	1.056
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.298
	TOTAL VOLUME =	**390.792**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 44 + 298.920 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	5.962	7.175	0.250	10.160	11.732

X2	SLOPE
0.29	2.309 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	15.143
APRON OUTLET	Vol. = Lo * X * T	18.225
TOE WALL INLET	Vol. = XS * T * (1-T)	2.200
TOE WALL OUTLET	Vol. = XS * T * (2-T)	5.133
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	4.204
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	5.038
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	4.371
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	5.261
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.593
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.731
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.583
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.718
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.244
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.244
	TOTAL VOLUME =	**64.688**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																					
	B	D	TOW	TIW	TBS	TTS	01		02		03		04		05		06		07		08		09		10		11	
							SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG
1	1000	1000	200	200	240	200	16	150	20	150	14	150	12	150	12	200	16	200										
2							16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150				
3							16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150
4							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
1	1500	1000	220	200	260	220	20	150	25	150	14	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	1500	1500	220	220	260	220	16	150	25	150	14	150	12	150	12	200	16	200										
2							16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
1	2000	1000	240	200	280	240	20	150	25	150	14	150	12	150	12	200	16	200										
2							20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
4							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
5							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
1	2000	1500	240	220	280	240	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
4							20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
5							25	150	25	150	14	150	14	150	12	200	16	200	25	150	20	150	20	150	20	150	12	150
1	2000	2000	240	240	280	240	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	16	150	16	150	12	200	16	200	25	150	16	150	16	150				
3							20	150	25	150	16	150	16	150	12	200	16	200	25	150	20	150	16	150	25	150	12	150
4							20	150	25	150	14	150	16	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150
5							25	150	25	150	14	150	16	150	12	200	16	200	25	150	20	150	20	150	20	150	12	150
1	2500	1000	280	200	320	280	20	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	2500	1500	280	220	320	280	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	2500	2000	280	240	320	280	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	16	150	14	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
5							20	150	20	150	16	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	2500	2500	280	260	320	280	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150				
3							20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150
4							20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	16	150	20	150	12	150
5							20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.																												
NO. OF VENTS	CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT																											
	DIMENSIONS (mm)						REINFORCEMENT																					
	B	D	TOW	TIW	TBS	TTS	01		02		03		04		05		06		07		08		09		10		11	
							SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG
1	3000	1000	320	200	360	320	20	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	3000	1500	320	220	360	320	16	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	3000	2000	320	240	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							16	150	20	150	16	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3000	2500	320	260	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3000	3000	320	280	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
4							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
5							25	150	20	150	16	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
1	3500	1000	360	200	400	360	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3500	1500	360	220	400	360	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3500	2000	360	240	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
4							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
5							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
1	3500	2500	360	260	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
4							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
5							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
1	3500	3000	360	280	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	20	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150
4							20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150
5							20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)							REINFORCEMENT																								
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
1	1000	1000	200	200	240	200	750	16	150	20	150	14	150	12	150	12	200	16	200											14 Y16	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150					14 Y16	Y12@200	2 Y10@200	6 Y14
3								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150	14 Y16	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y16	Y12@200	2 Y10@200	6 Y14
1	1500	1000	220	200	260	220	850	20	150	25	150	14	150	12	150	12	200	16	200											14 Y18	Y12@200	2 Y10@200	6 Y14
2								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150					14 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
1	1500	1500	220	220	260	220	850	16	150	25	150	14	150	12	150	12	200	16	200											14 Y18	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					14 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
1	2000	1000	240	200	280	240	950	20	150	25	150	14	150	12	150	12	200	16	200											14 Y20	Y12@200	2 Y10@200	6 Y16
2								20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					14 Y20	Y12@200	2 Y10@200	6 Y16
3								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y14
1	2000	1500	240	220	280	240	950	16	150	25	150	16	150	12	150	12	200	16	200											14 Y20	Y12@200	2 Y10@200	6 Y16
2								20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150					14 Y20	Y12@200	2 Y10@200	6 Y16
3								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y16
4								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y16
1	2500	1000	280	200	320	280	950	20	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y16
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y16
1	2500	1500	280	220	320	280	950	20	150	25	150	16	150	12	150	12	200	16	200											14 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1000	320	200	360	320	950	20	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150					14 Y22	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
1	3000	1500	320	220	360	320	950	16	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
1	3500	1000	360	200	400	360	950	20	150	25	150	16	150	12	150	12	200	16	200											14 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150					14 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	3000	360	280	400	360	950	16	150	25	150	16	150	12	150	12	200	16	200											14 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150					14 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	20	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150	14 Y25	Y12@200	2 Y10@200	6 Y25
4								20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150	14 Y25	Y12@200	2 Y10@200	6 Y25

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)							REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
1	1000	1000	200	200	240	200	500	16	150	20	150	14	150	12	150	12	200	16	200											10 Y16	Y12@200	2 Y10@200	6 Y12
2								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150					10 Y16	Y12@200	2 Y10@200	6 Y12
3								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150	10 Y16	Y12@200	2 Y10@200	6 Y12
4								20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y16	Y12@200	2 Y10@200	6 Y12
1	1500	1000	220	200	260	220	600	20	150	25	150	14	150	12	150	12	200	16	200											10 Y18	Y12@200	2 Y10@200	6 Y14
2								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150					10 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
1	1500	1500	220	220	260	220	600	16	150	25	150	14	150	12	150	12	200	16	200											10 Y18	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					10 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
1	2000	1000	240	200	280	240	850	20	150	25	150	14	150	12	150	12	200	16	200											10 Y20	Y12@200	2 Y10@200	6 Y14
2								20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					10 Y20	Y12@200	2 Y10@200	6 Y14
3								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
1	2000	1500	240	220	280	240	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y20	Y12@200	2 Y10@200	6 Y14
2								20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150					10 Y20	Y12@200	2 Y10@200	6 Y14
3								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
1	2500	1000	280	200	320	280	850	20	150	20	150	14	150	12	150	12	200	14	200											10 Y22	Y12@200	2 Y10@200	6 Y16
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y16
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y16
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y16
1	2500	1500	280	220	320	280	850	20	150	25	150	16	150	12	150	12	200	16	200											10 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	2500	1500	280	220	320	280	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y22	Y12@200	2 Y10@200	6 Y20
2								20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1000	320	200	360	320	850	20	150	20	150	14	150	12	150	12	200	14	200											10 Y22	Y12@200	2 Y10@200	6 Y20
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150					10 Y22	Y12@200	2 Y10@200	6 Y20
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1500	320	220	360	320	850	16	150	20	150	14	150	12	150	12	200	14	200											10 Y25	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y20
1	3000	1500	320	220	360	320	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y25
2								16	150	20	150	16	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	1000	360	200	400	360	850	20	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	3000	360	280	400	360	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150	10 Y25	Y12@200	2 Y10@200	6 Y20

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
2	4000	4000	380	250	480	400	900	20	150	16	150	16	150	14	150	10	150	10	150	22	150	16	150	10	150					12 Y25	Y12@200	2 Y10@200	8 Y22
1	4500	2000	400	250	520	400	900																										
2								16	150	20	150	16	150	12	150	12	150	12	150	22	150	16	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	2500	400	250	520	400	900																										
2								16	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	3000	400	250	520	400	900																										
2								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	18	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	3500	400	250	520	400	900																										
2								18	150	20	150	18	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	18	150	12	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								20	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	4000	400	250	520	400	900																										
2								20	150	20	150	18	150	14	150	12	150	12	150	25	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								20	150	22	150	18	150	14	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								20	150	22	150	18	150	14	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	45000	400	250	520	400	900																										
2								22	150	20	150	18	150	16	150	12	150	12	150	25	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								22	150	22	150	18	150	16	150	12	150	12	150	22	150	18	150	12	150	20	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								22	150	22	150	18	150	16	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	

NOTES:

1. DESIGN WAS MADE ACCORDING TO M.O.C. MANUAL.
2. CONCRETE SPECIFIED CYLINDER STRENGTH 270 KGS/CM² AFTER 28 DAYS.
3. REINFORCEMENT STEEL YIELD STRENGTH 4200 KG/CM²
4. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE MENTIONED
5. CONCRETE COVER:
   - TOP SLAB
     - TOP REINFORCEMENT = 50mm
     - BOTTOM REINF. = 30mm.
   - BOTTOM SLAB & EXTERNAL WALLS
     - EXTERNAL REINF. = 50mm.
     - INTERNAL REINF. = 30mm.
   - INTERNAL WALLS REINF. = 30mm.
6. FOR R.C. BOX CULVERTS WITH 11 VENTS USE TWO SECTIONS 4 VENTS R.C. BOX CULVERTS PLUS ONE SECTION 3 VENTS R.C. BOX CULVERT WITH INTERMEDIATE EXPANSION JOINTS
7. FOR R.C. BOX CULVERTS WITH 15 & 20 VENTS USE 3 & 4 SECTIONS 5 VENTS R.C. BOX CULVERTS RESPECTIVELY WITH INTERMEDIATE EXPANSION JOINTS

TWO CELLS R.C. BOX CULVERT

ONE CELL R.C. BOX CULVERT

THREE CELLS R.C. BOX CULVERT

FOUR CELLS R.C. BOX CULVERT

FIVE CELLS R.C. BOX CULVERT

BOX CULVERT ENDut cursor here f

ONE CELL R.C. BOX CULVERT

FOUR CELLS R.C. BOX CULVERT

TWO CELLS R.C. BOX CULVERT

THREE CELLS R.C. BOX CULVERT

ut cursor here f

BOX CULVERT
END DETAIL PLANS
45º SKEW & 60º SKEW

TYPICAL END PLAN
Box Culvert One Cell

TYPICAL END PLAN
Box Culvert Two Cells

TYPICAL END PLAN
Box Culvert Three Cells

TYPICAL END PLAN
Box Culvert Four Cells

TYPICAL END PLAN
Box Culvert Four Cells

TYPICAL END PLAN
Box Culvert Three Cells

TYPICAL END PLAN
Box Culvert Two Cells

TYPICAL END PLAN
Box Culvert One Cell

WALL & BARREL ELEVATION

PART LONGITUDINAL SECTION

EDGE CURB WIDTH	
EMBANKMENT SLOPE	WIDTH (WC)
6 : 1	0.60
4 : 1	0.40
3 : 1	0.30
2 : 1	0.20

PART SEC. A – A

DETAIL " A "

RCBC 3 - CELLS

CROSS - SECTIONAL DIMENSIONS & REINFORCEMENT																																
RCBC CELL DIMENSIONS						R E I N F O R C E M E N T																										
SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG	LGTH	SIZE	SPCG	LGTH	SIZE	SPCG	LGTH	SIZE	SPCG	LGTH	SIZE	SPCG	LGTH	SIZE	SPCG	LGTH	SIZE	SPCG	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT END SECTION OF CULVERT						**TABLE 1 - 1.50m. FILL COVER OR LESS**																										
1.00	1.00	0.24	0.20	0.20	0.20	14	0.44	0.97	14	0.44	1.96	14	0.44	2.10	20	0.26	1.36	20	0.26	1.40	14	0.44	1.82	14	0.44	1.57	21	27	7	3	68
1.50	1.00	0.26	0.22	0.22	0.20	14	0.30	1.19	14	0.40	2.66	14	0.40	2.95	20	0.22	1.88	20	0.22	1.90	14	0.40	1.86	14	0.44	1.61	27	36	7	3	83
	1.50				0.22		0.30	1.34		0.40	2.68		0.40	2.99		0.20	1.90		0.22	1.94		0.40	2.36		0.44	2.11			9	4	89
2.00	1.00	0.28	0.24	0.24	0.20	14	0.18	1.40	14	0.36	3.35	14	0.36	3.80	20	0.20	2.40	20	0.18	2.40	14	0.36	1.90	14	0.44	1.65	33	48	7	3	101
	1.50				0.22		0.18	1.55		0.36	3.37		0.36	3.81		0.18	2.42		0.18	2.44		0.36	2.40		0.44	2.15			9	4	107
	2.00				0.24		0.18	1.70		0.36	3.39		0.36	3.88		0.18	2.44		0.18	2.48		0.36	2.90		0.44	2.65			11	5	113
2.50	1.00	0.32	0.28	0.28	0.20	16	0.30	1.66	14	0.30	4.07	14	0.30	4.65	24	0.28	2.94	24	0.28	2.90	14	0.30	1.98	14	0.44	1.73	39	51	7	3	110
	1.50				0.22		0.30	1.81		0.30	4.09		0.30	4.69		0.28	2.96		0.28	2.94		0.30	2.48		0.44	2.23			9	4	116
	2.00				0.24		0.30	1.96		0.30	4.11		0.30	4.73		0.28	2.98		0.28	2.98		0.30	2.98		0.44	2.73			11	5	122
	2.50				0.26		0.30	2.11		0.30	4.13		0.30	4.77		0.26	3.00		0.28	3.02		0.30	3.48		0.44	3.23			13	6	128
3.00	1.00	0.36	0.32	0.32	0.20	16	0.36	1.91	14	0.24	4.78	14	0.24	5.50	24	0.30	3.48	24	0.28	3.40	14	0.24	2.06	14	0.44	1.81	45	54	7	3	119
	1.50				0.22		0.36	2.06		0.24	4.80		0.24	5.54		0.28	3.50		0.28	3.44		0.24	2.56		0.44	2.31			9	4	125
	2.00				0.24		0.36	2.21		0.24	4.82		0.24	5.58		0.28	3.52		0.28	3.48		0.24	3.06		0.44	2.81			11	5	131
	2.50				0.26		0.36	2.36		0.24	4.84		0.24	5.62		0.28	3.54		0.28	3.52		0.24	3.56		0.44	3.31			13	6	137
	3.00				0.28		0.36	2.51		0.24	4.86		0.24	5.66		0.26	3.56		0.28	3.56		0.24	4.06		0.44	3.81			15	7	143
3.50	1.00	0.40	0.36	0.36	0.20	16	0.36	2.17	16	0.24	5.55	14	0.24	6.35	24	0.30	4.02	24	0.28	3.90	14	0.24	2.14	14	0.44	1.89	51	60	7	3	131
	1.50				0.22		0.36	2.32		0.24	5.57		0.24	6.39		0.30	4.04		0.28	3.94		0.24	2.64		0.44	2.39			9	4	137
	2.00				0.24		0.36	2.47		0.24	5.59		0.24	6.43		0.28	4.06		0.28	3.98		0.24	3.14		0.44	2.89			11	5	143
	2.50				0.26		0.36	2.62		0.24	5.61		0.24	6.47		0.28	4.08		0.28	4.02		0.24	3.64		0.44	3.39			13	6	149
	3.00				0.28		0.36	2.77		0.24	5.63		0.24	6.51		0.28	4.10		0.28	4.06		0.24	4.14		0.44	3.89			15	7	155

RCBC 3 - CELLS

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT END SECTION OF CULVERT						**TABLE 2 - FILL COVER OVER 1.50m. TO 5.0m.**																									
1.00	1.00	0.24	0.20	0.20	0.20	14	0.44	0.97	14	0.44	1.96	14	0.44	2.10	14	0.44	1.36	14	0.44	1.40	14	0.44	1.82	14	0.44	1.57	21	21	7	3	62
1.50	1.00	0.26	0.22	0.22	0.20	14	0.40	1.19	14	0.40	2.66	14	0.40	2.95	14	0.36	1.88	14	0.44	1.90	14	0.40	1.86	14	0.44	1.61	27	27	7	3	74
	1.50				0.22		0.40	1.34		0.40	2.68		0.40	2.99		0.36	1.90		0.44	1.94		0.40	2.36		0.44	2.11			9	4	80
2.00	1.00	0.28	0.24	0.24	0.20	14	0.40	1.40	16	0.40	3.40	14	0.30	3.80	14	0.28	2.40	14	0.34	2.40	14	0.40	1.90	14	0.44	1.65	33	33	7	3	86
	1.50				0.22		0.40	1.55		0.40	3.42		0.30	3.84		0.26	2.42		0.34	2.44		0.40	2.40		0.44	2.15			9	4	92
	2.00				0.24		0.40	1.70		0.40	3.44		0.30	3.88		0.26	2.44		0.34	2.48		0.40	2.90		0.44	2.65			11	5	98
2.50	1.00	0.32	0.28	0.28	0.20	14	0.36	1.66	16	0.36	4.12	14	0.24	4.65	14	0.22	2.94	14	0.28	2.90	14	0.36	1.98	14	0.44	1.73	39	39	7	3	98
	1.50				0.22		0.36	1.81		0.36	4.14		0.24	4.69		0.20	2.96		0.28	2.94		0.36	2.48		0.44	2.23			9	4	104
	2.00				0.24		0.36	1.96		0.36	4.16		0.24	4.73		0.20	2.98		0.28	2.98		0.36	2.98		0.44	2.73			11	5	110
	2.50				0.26		0.36	2.11		0.36	4.18		0.24	4.77		0.20	3.00		0.28	3.02		0.36	3.48		0.44	3.23			13	6	116
3.00	1.00	0.36	0.32	0.32	0.20	14	0.24	1.91	16	0.36	4.83	14	0.18	5.50	14	0.18	3.48	14	0.24	3.40	14	0.36	2.06	14	0.44	1.81	45	45	7	3	110
	1.50				0.22		0.24	2.06		0.36	4.85		0.18	5.54		0.18	3.50		0.24	3.44		0.36	2.56		0.44	2.31			9	4	116
	2.00				0.24		0.24	2.21		0.36	4.87		0.18	5.58		0.16	3.52		0.24	3.48		0.36	3.06		0.44	2.81			11	5	122
	2.50				0.26		0.24	2.36		0.36	4.89		0.18	5.62		0.16	3.54		0.24	3.52		0.36	3.56		0.44	3.31			13	6	128
	3.00				0.28		0.24	2.51		0.36	4.91		0.18	5.66		0.16	3.56		0.24	3.56		0.36	4.06		0.44	3.81			15	7	134
3.50	1.00	0.40	0.36	0.36	0.20	14	0.28	2.17	20	0.28	5.60	16	0.28	6.35	14	0.16	4.02	14	0.20	3.90	14	0.28	2.14	14	0.44	1.89	51	51	7	3	122
	1.50				0.22		0.28	2.32		0.28	5.62		0.28	6.39		0.14	4.04		0.20	3.94		0.28	2.64		0.44	2.39			9	4	128
	2.00				0.24		0.28	2.47		0.28	5.64		0.28	6.43		0.14	4.06		0.20	3.98		0.28	3.14		0.44	2.89			11	5	134
	2.50				0.26		0.28	2.62		0.28	5.66		0.28	6.47		0.14	4.08		0.20	4.02		0.28	3.64		0.44	3.39			13	6	140
	3.00				0.28		0.28	2.77		0.28	5.68		0.28	6.51		0.14	4.10		0.20	4.06		0.28	4.14		0.44	3.89			15	7	146

RCBC 3 - CELLS

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT FIRST INTERMEDIATE SECTION						**TABLE 3 - FILL COVER OVER 5.0m TO 10.0m**																									
1.00	1.00	0.28	0.24	0.24	0.24	14	0.44	1.05	14	0.44	2.00	14	0.44	2.10	14	0.42	1.40	14	0.44	1.40	14	0.44	1.90	14	0.44	1.65	21	21	7	3	62
1.50	1.00	0.30	0.26	0.26	0.24	14	0.40	1.27	16	0.40	2.75	14	0.30	2.95	14	0.26	1.92	14	0.36	1.90	14	0.40	1.94	14	0.44	1.69	27	27	7	3	74
	1.50				0.26		0.40	1.42		0.40	2.77		0.30	2.99		0.26	1.94		0.36	1.94		0.40	2.44		0.44	2.19			9	4	80
2.00	1.00	0.32	0.28	0.28	0.24	14	0.32	1.48	20	0.32	3.49	16	0.32	3.80	16	0.24	2.44	14	0.26	2.40	14	0.32	1.98	14	0.44	1.73	33	33	7	3	86
	1.50				0.26		0.32	1.63		0.32	3.51		0.32	3.84		0.22	2.46		0.26	2.44		0.32	2.48		0.44	2.23			9	4	92
	2.00				0.28		0.32	1.78		0.32	3.53		0.32	3.88		0.22	2.48		0.26	2.48		0.32	2.98		0.44	2.73			11	5	98
2.50	1.00	0.36	0.32	0.32	0.24	14	0.32	1.74	20	0.32	4.21	16	0.32	4.65	16	0.18	2.98	14	0.20	2.90	14	0.32	2.06	14	0.44	1.81	39	39	7	3	98
	1.50				0.26		0.32	1.89		0.32	4.23		0.32	4.69		0.18	3.00		0.20	2.94		0.32	2.56		0.44	2.31			9	4	104
	2.00				0.28		0.32	2.04		0.32	4.25		0.32	4.73		0.16	3.02		0.20	2.98		0.32	3.06		0.44	2.81			11	5	110
	2.50				0.30		0.32	2.19		0.32	4.27		0.32	4.77		0.16	3.04		0.20	3.02		0.32	3.56		0.44	3.31			13	6	116
3.00	1.00	0.42	0.38	0.38	0.24	14	0.24	2.03	20	0.24	4.94	16	0.24	5.50	20	0.24	3.54	16	0.22	3.40	14	0.24	2.18	14	0.44	1.93	45	45	7	3	110
	1.50				0.26		0.24	2.18		0.24	4.96		0.24	5.54		0.24	3.56		0.22	3.44		0.24	2.68		0.44	2.43			9	4	116
	2.00				0.28		0.24	2.33		0.24	4.98		0.24	5.58		0.24	3.58		0.22	3.48		0.24	3.18		0.44	2.93			11	5	122
	2.50				0.30		0.24	2.48		0.24	5.00		0.24	5.62		0.22	3.60		0.22	3.52		0.24	3.68		0.42	3.43			13	6	128
	3.00				0.32		0.24	2.63		0.24	5.06		0.24	5.66		0.22	3.62		0.22	3.56		0.24	4.18		0.40	3.93			15	7	134
3.50	1.00	0.48	0.44	0.44	0.24	16	0.36	2.33	20	0.24	5.68	20	0.24	6.35	20	0.22	4.10	16	0.18	3.90	14	0.24	2.30	14	0.44	2.05	51	51	7	3	122
	1.50				0.26		0.36	2.48		0.24	5.70		0.24	6.39		0.22	4.12		0.18	3.94		0.24	2.80		0.44	2.55			9	4	128
	2.00				0.28		0.36	2.63		0.24	5.72		0.24	6.43		0.20	4.14		0.18	3.98		0.24	3.30		0.44	3.05			11	5	134
	2.50				0.30		0.36	2.78		0.24	5.74		0.24	6.47		0.20	4.16		0.18	4.02		0.24	3.80		0.42	3.55			13	6	140
	3.00				0.32		0.36	2.93		0.24	5.76		0.24	6.51		0.20	4.18		0.18	4.06		0.24	4.30		0.40	4.05			15	7	146

QUANTITIES PER METER OF CULVERT								
RCBC		FOR TABLE 1 & 2			TABLE 3		TABLE 4	
S	H	C C.M.	STEEL KGS. TAB 1	STEEL KGS. TAB 2	C C.M.	STL KGS.	C C.M.	STL KGS.
1.00	1.00	2.472	232	169	2.978	173	3.496	180
1.50	1.00	3.403	326	219	4.035	251	4.660	292
	1.50	3.902	355	237	4.618	270	5.346	314
2.00	1.00	4.458	446	294	5.216	392	7.048	414
	1.50	4.978	482	316	5.820	419	7.800	437
	2.00	5.539	505	335	6.464	440	8.592	461
2.50	1.00	6.036	529	382	6.927	416	9.947	569
	1.50	6.600	552	406	7.574	517	10.786	606
	2.00	7.204	574	428	8.262	551	11.664	629
	2.50	7.848	608	448	8.989	574	12.502	656
3.00	1.00	7.867	621	492	9.368	688	13.378	768
	1.50	8.474	656	513	10.080	711	14.302	806
	2.00	9.122	679	546	10.832	735	15.267	832
	2.50	9.809	703	567	11.624	774	16.272	860
	3.00	10.536	740	588	12.456	800	17.317	888
3.50	1.00	9.951	738	662	12.198	851	17.918	933
	1.50	10.602	762	702	12.974	875	18.950	978
	2.00	11.292	799	724	12.791	917	20.023	1004
	2.50	12.022	822	746	14.648	943	21.136	1033
	3.00	12.793	845	768	15.545	969	22.289	1086

CUTTING & BENDING DIAGRAMS

BAR SIZE	MIN. X
14Ø	0.25
16Ø	0.30
20Ø	0.35
24Ø	0.40
32Ø	0.60

NOTES FOR REINFORCEMENT BARS

1.) FABRICATION & TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE
2.) ALL DIMENSIONS ARE OUT TO OUT BARS
3.) NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR UNLESS OTHERWISE NOTED
4.) WEIGHT MEASUREMENT FOR ESTIMATING PURPOSES IS MADE TO THE NEAREST KILOGRAM PER METER OF CULVERT.

NOTE:

CONSTRUCTION JOINTS PERPENDICULAR TO THE LONGITUDINAL AXIS OF THE CULVERT SHALL BE PROVIDED TO A MAXIMUM OF 30m. INTERVALS

NEW LOADING - 3 AXLE 600KN TRUCK

CONSTRUCTION JOINT DETAIL

TYPICAL NORMAL SECTION OF CULVERT

NOTE:

ALL TRANSVERSE & OTHER LONGI. REINF. ARE THE SAME AS THOSE SHOWN IN TYPICAL NORMAL SECTION

TOP SLAB FOR TABLE 1

BAR SPACES FOR 14Ø LONGITUDINAL REINF.							
s	a	b	e	f	H	c	d
1.00	2	3	1	3	1.00	3	2
1.50	3	4	1	5	1.50	4	3
2.00	4	5	2	6	2.00	5	4
2.50	5	6	2	6	2.50	6	5
3.00	6	7	2	6	3.00	7	6
3.50	7	8	2	7	-	-	-

NOTE MIN. LAP SPLICES FOR LONGIT. BARS SHALL BE 0.5m.

NOTE ON SLAB BARS,
TERMINAL ENDS OF BARS FOR THE INTERMEDIATE SECTIONS SHALL BE IN LINE WITH THOSE FOR THE END SECTION OF CULVERT

RCBC 3 - CELLS

RCBC 3 - CELLS

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT SECOND INTERMEDIATE SECTION						**TABLE 4 - FILL COVER OVER 10.0m. TO 15.0m.**																									
1.00	1.00	0.32	0.28	0.28	0.28	14	0.44	1.13	14	0.44	2.04	14	0.44	2.10	14	0.34	1.44	14	0.44	1.40	14	0.44	1.98	14	0.44	1.73	21	21	7	3	62
1.50	1.00	0.34	0.30	0.30	0.28	14	0.24	1.35	16	0.36	2.79	14	0.24	2.95	14	0.20	1.96	14	0.28	1.90	14	0.36	2.02	14	0.44	1.77	27	27	7	3	74
	1.50				0.30		0.24	1.50		0.36	2.81		0.24	2.99		0.20	1.98		0.28	1.94		0.36	2.52		0.42	2.27			9	4	80
2.00	1.00	0.42	0.38	0.38	0.28	14	0.36	1.68	16	0.24	3.54	16	0.24	3.80	14	0.16	2.54	14	0.24	2.40	14	0.24	2.18	14	0.44	1.93	33	33	7	3	86
	1.50				0.30		0.36	1.83		0.24	3.56		0.24	3.84		0.16	2.56		0.24	2.44		0.24	2.68		0.42	2.43			9	4	92
	2.00				0.32		0.36	1.98		0.24	3.58		0.24	3.88		0.16	2.58		0.24	2.48		0.24	3.18		0.40	2.93			11	5	98
2.50	1.00	0.50	0.46	0.46	0.28	14	0.42	2.02	20	0.28	4.35	20	0.28	4.65	16	0.18	3.12	14	0.18	2.90	14	0.28	2.34	14	0.44	2.09	39	39	7	3	98
	1.50				0.30		0.42	2.17		0.28	4.37		0.28	4.69		0.16	3.14		0.18	2.94		0.28	2.84		0.42	2.59			9	4	104
	2.00				0.32		0.42	2.32		0.28	4.39		0.28	4.73		0.16	3.16		0.18	2.98		0.28	3.34		0.40	3.09			11	5	110
	2.50				0.34		0.42	2.47		0.28	4.41		0.28	4.77		0.16	3.18		0.18	3.02		0.28	3.84		0.36	3.59			13	6	116
3.00	1.00	0.58	0.54	0.54	0.28	16	0.30	2.35	24	0.30	5.20	20	0.30	5.50	20	0.24	3.70	14	0.16	3.40	14	0.30	2.50	14	0.44	2.25	45	45	7	3	110
	1.50				0.30		0.30	2.50		0.30	5.22		0.30	5.54		0.22	3.72		0.16	3.44		0.30	3.00		0.42	2.75			9	4	116
	2.00				0.32		0.30	2.65		0.30	5.24		0.30	5.58		0.22	3.74		0.16	3.48		0.30	3.50		0.40	3.25			11	5	122
	2.50				0.34		0.30	2.80		0.30	5.26		0.30	5.62		0.22	3.76		0.16	3.52		0.30	4.00		0.36	3.75			13	6	128
	3.00				0.36		0.30	2.95		0.30	5.28		0.30	5.66		0.22	3.78		0.16	3.56		0.30	4.50		0.34	4.25			15	7	134
3.50	1.00	0.68	0.64	0.64	0.28	16	0.28	2.73	24	0.28	5.93	20	0.28	6.35	20	0.22	4.30	14	0.14	3.90	14	0.28	2.70	14	0.44	2.45	51	51	7	3	122
	1.50				0.30		0.28	2.88		0.28	5.95		0.28	6.39		0.20	4.32		0.14	3.94		0.28	3.20		0.42	2.95			9	4	128
	2.00				0.32		0.28	3.03		0.28	5.97		0.28	6.43		0.20	4.34		0.14	3.98		0.28	3.70		0.40	3.45			11	5	134
	2.50				0.34		0.28	3.18		0.28	5.99		0.28	6.47		0.20	4.36		0.14	4.02		0.28	4.20		0.36	3.95			13	6	140
	3.00				0.36		0.28	3.33		0.28	6.01		0.28	6.51		0.18	4.38		0.14	4.06		0.28	4.70		0.34	4.45			15	7	146

SCHEDULE OF EDGE BEAM				
NO.	SPAN	DIMENSIONS	MAIN REINFORCEMENT	STIRRUPS
FOR ANGLE = 90º				
1	1.00	0.50 m x 0.20 m	8 - 16 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.55 m x 0.22 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.60 m x 0.24 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.60 m x 0.28 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.60 m x 0.32 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.60 m x 0.36 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
FOR ANGLE = 60º				
1	1.00	0.50 m x 0.20 m	8 - 18 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.60 m x 0.22 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.65 m x 0.22 m	10 - 20 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.65 m x 0.28 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.65 m x 0.32 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.65 m x 0.36 m	10 - 24 E 101 (TOP & BOTTOM)	- DO -
FOR ANGLE = 45º				
1	1.00	0.70 m x 0.20 m	10 - 18 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.85 m x 0.22 m	14 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.95 m x 0.24 m	14 - 20 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.95 m x 0.26 m	14 - 22 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.95 m x 0.32 m	14 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.95 m x 0.36 m	14 - 24 E 101 (TOP & BOTTOM)	- DO -

EDGE CURB WIDTH	
EMBANKMENT SLOPE	WIDTH (WC)
6 : 1	0.60
4 : 1	0.40
3 : 1	0.30
2 : 1	0.20

BAR Ø	UNIT WT.
10	0.617
12	0.888
14	1.21
16	1.58
18	2.00
20	2.47
22	2.98
24	3.55
25	3.85

DETAIL OF THE EXTENSION OF EXISTING R.C. BOX CULVERT

Please see notes here

TYPICAL LONGITUDINAL SECTION OF CULVERT

DETAIL A
EXPANSION JOINT DETAIL

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

SLOPE = 6 : 1

S	H	W1	W2	X2
1.00	0.70	0.20	0.20	0.20
1.50	0.70	0.22	0.20	0.20
2.00	0.70	0.24	0.20	0.20
2.50	0.70	0.28	0.20	0.24
3.00	0.70	0.32	0.20	0.24
3.50	0.70	0.36	0.20	0.24

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 2 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	6	8	12	16	18	22

Slope = 3 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Slope = 4 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Note:

Outer Wing Wall Key in Slope 2 : 1 = W1 + 0.10
But for 3 : 1 & 4 : 1 = W1 + 0.20

Station **18+719**

RCBC **4 - 3.00 x 3.00**

R. C. B. C.

cell 4

T1 = 0.36 W1 = 0.32
T2 = 0.32 W2 = 0.28
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 0.000
Outer Shoulder = 2.000
Shoulder Slope = 4.000
C.L.elev.= 950.749
B.C. slope = -0.05000

Skew = 90 ° Normal
P.G.L. = 957.491
SL = 0.015000 SR = -0.015000
C.W. = 3.250
H/MED. = 0.000
Layer = 0.250

Station 18+719 **skew 90° Normal**

	S	H	T1	T2	W1	W2	TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1=P2	No. of Pane	TOTAL
4	3.00	3.00	0.36	0.32	0.32	0.28	0.50	13.48	20.000	1	20.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1, P1=P2 20.000 m.	A	1.18 / 1.33	0.24	14	2.510	0.00	2.51	84 x 4 = 336	843.360	1.21	1020.466
	B	4.61 / x=0.30	0.36	16	4.910	0	4.91	56 x 4 = 224	1099.840	1.58	1737.747
	C	5.66	0.18	14	5.66	0	5.66	112 x 4 = 448	2535.680	1.21	3068.173
	D	3.56	0.16	14	3.56	0	3.56	126 x 4 = 504	1794.240	1.21	2171.030
	E	6.84	0.24	14	6.84	0	6.84	84 x 2 = 168	1149.120	1.21	1390.435
	F	x=0.25 / 3.56	0.36	14	4.06	0	4.06	56 x 2 = 112	454.720	1.21	550.211
	G	x=0.25 / 3.56	0.44	14	3.81	0	3.81	46 x 5 = 230	876.300	1.21	1060.323
	LONG'NAL 20.000	12 / 8.740 / o.l. = 60*dia.	VAR.	14	20.740	0	20.740	59+59+15*2+7*3 169	3505.060	1.21	4241.123
										SUB TOTAL =	15239.508

Station 18+719 **skew 90° Normal**

TABLE 2

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	BARREL LENGTH P3		TOTAL
4	3.00	3.00	0.36	0.32	0.32	0.28	0.50	13.48	5.188		5.188

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P3 5.188 m.	A	1.18 / 1.33	0.24	14	2.510	0.00	2.51	22 x 4 = 88	220.880	1.21	267.265
	B	4.61 / x=0.30	0.36	16	4.910	0	4.91	15 x 4 = 60	294.600	1.58	465.468
	C	5.66	0.18	14	5.66	0	5.66	29 x 4 = 116	656.560	1.21	794.438
	D	3.56	0.16	14	3.56	0	3.56	33 x 4 = 132	469.920	1.21	568.603
	E	6.84	0.24	14	6.84	0	6.84	22 x 2 = 44	300.960	1.21	364.162
	F	x=0.25 / 3.56	0.36	14	4.06	0	4.06	15 x 2 = 30	121.800	1.21	147.378
	G	x=0.25 / 3.56	0.44	14	3.81	0	3.81	13 x 5 = 65	247.650	1.21	299.657
	LONG'NAL 5.188	0 / 5.088	VAR.	14	5.088	0	5.088	59+59+15*2+7*3 169	859.872	1.21	1040.445
										SUB TOTAL =	3947.415

Station 18+719 **skew 90**

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS	L	X	xs
4	3.00	3.00	0.32	0.28	0.36	0.20	0.60	0.32	55.852	13.480	13.480

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.347 0.24	0.3	12	1.373	0	1.373	46 x 4 = 184	252.693	0.888	224.392
	E101	14.720	-	22	14.720	0	14.720	10 x 2 = 20	294.40	2.980	877.312
	E102	14.240	-	14	14.240	0	14.240	2 x 2 = 4	56.96	1.21	68.922
	E103	0.156 0.34 0.24 0.15	0.2	12	1.036	0	1.036	68 x 2 = 136	140.92	0.888	125.140
END BARREL KEY	H301	14.840	-	24	14.840	0	14.840	4 x 2 = 8	118.720	3.550	421.456
	H302	0.320 0.467 0.33 0.320	0.15	14	1.437	0	1.437	90 x 2 = 180	258.604	1.210	312.911
	H300 *WALL*	0.800 dowel	0.3	16	0.800	0	0.800	11 x 10 = 110	88.00	1.580	139.040
	H300 *BOT.SLAB*	0.800 dowel	0.15	16	0.800	0	0.800	90 x 1 = 90	72.00	1.580	113.760
	WALL *EXP. JT.*	0.800 dowel	0.3	16	0.800	0	0.800	11 x 10 = 110	88.00	1.580	139.040
	Top & Bot. *EXP. JT.*	0.800 dowel	0.15	16	0.800	0	90+90 = 0.800	180 x 1 = 180	144.00	1.580	227.520
										SUB TOTAL =	**2649.493**

Station 18+719 skew 90 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	3.00	0.36	0.32	0.32	0.28	26.56500°	2.86240°		13.480	6.036

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	14.220	as	14	14.220	0.00	14.220	2 x 1 = 2	28.440	1.21	34.412
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	90 x 1 = 90	120.032	1.21	145.239
	A100	5.936	as	12	5.936	0	5.936	6 x 5 = 30	178.080	0.888	158.135
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	31 x 2 = 62	112.436	1.21	136.047
	F202	0.25 0.25 0.346 0.414 0.346	0.2	14	1.607	0	1.607	31 x 3 = 93	149.448	1.21	180.832
	F300 G300	5.936	0.15	12	5.936	0	5.936	80 x 2 = 160	949.760	0.888	843.387
	L4 F301	14.240 x=0.15	0.15	14	14.540	0	14.540	41 x 1 = 41	596.140	1.21	721.329
	L4 G301	14.240 x=0.15	0.15	12	14.540	0	14.540	41 x 1 = 41	596.140	0.888	529.372
										TOTAL FOR INLET APRON	**2748.754**

Station 18+719 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	3.00	0.36	0.32	0.32	0.28	26.56500°	-2.86240°		13.480	6.036

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.716	as	12	6.716	0	6.716	2 x 5 = 10	67.159	0.888	59.637
	B101-18Ø	0.15 ave = 2.903 0.38 max = 3.398 min = 2.408	0.15	18	3.433	0	3.433	13 x 2 = 26	89.27	2.000	178.540
	B101-14Ø	0.15 ave = 1.249 0.38 max = 2.333 min = 0.164	0.15	14	1.779	0	1.779	27 x 2 = 54	96.04	1.210	116.209
	C101	0.15 ave = 1.781 0.24 max = 3.398 min = 0.164	0.15	12	2.171	0	2.171	40 x 2 = 80	173.68	0.888	154.230
	D101-16Ø	0.15 ave = 2.903 0.34 max = 3.398 min = 2.408	0.15	16	3.393	0	3.393	13 x 6 = 78	264.69	1.580	418.210
	D101-14Ø	0.15 ave = 1.249 0.34 max = 2.333 min = 0.164	0.15	14	1.739	0	1.739	27 x 6 = 162	281.72	1.210	340.879
	A101	ave = 3.004 max = 5.680 min = 0.328	0.15	12	3.004	0	3.004	21 x 10 = 210	630.845	0.888	560.191
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	22 x 2 = 44	50.134	0.888	44.519
	B109	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B110	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B116	0.300 3.62	as	20	3.920	0	3.920	2 x 2 = 4	15.680	2.47	38.730
	C189	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	C190	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	D135	0.300 3.62	as	16	3.920	0	3.920	2 x 3 = 6	23.520	1.58	37.162
	D136	0.300 3.62	as	16	3.920	0	3.920	2 x 3 = 6	23.520	1.58	37.162
	E300	0.300 0.200 0.300	0.15	12	0.800	0	0.800	21 x 3 = 63	50.400	0.888	44.755
									TOTAL FOR INLET WING WALL		**2082.875**

Station 18+719 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	3.00	0.36	0.32	0.32	0.28	26.565 °			13.480	6.036

TOE WALL (INLET)	A205	14.220	as	14	14.220	0	14.220	10 x 1 = 10	142.200	1.21	172.062
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	90 x 1 = 90	233.100	1.21	282.051
									TOTAL FOR INLET TOE WALL		**454.113**

Station 18+719 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	3.00	0.36	0.32	0.32	0.28	26.56500°	2.86240°		13.480	7.378

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	14.220	as	14	14.220	0.00	14.220	2 x 1 = 2	28.440	1.21	34.412
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	90 x 1 = 90	120.032	1.21	145.239
	A100	7.278	as	12	7.278	0	7.278	6 x 5 = 30	218.340	0.888	193.886
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	37 x 2 = 74	134.198	1.21	162.379
	F202	0.25 0.25 0.346 0.414 0.346	0.2	14	1.607	0	1.607	37 x 3 = 111	178.373	1.21	215.831
	F300 G300	7.278	0.15	12	7.278	0	7.278	80 x 2 = 160	1164.480	0.888	1034.058
	L4 F301	14.240 x=0.15	0.15	14	14.540	0	14.540	50 x 1 = 50	727.000	1.21	879.670
	L4 G301	14.240 x=0.15	0.15	12	14.540	0	14.540	50 x 1 = 50	727.000	0.888	645.576
										TOTAL FOR OUTLET APRON	**3311.052**

Station 18+719 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	3.00	0.36	0.32	0.32	0.28	26.56500°	2.86240°		13.480	7.378

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.915	as	12	7.915	0	7.915	2 x 5 = 10	79.151	0.888	70.286
	B101-18Ø	0.15 ave =2.993 0.38 max =3.398 min =2.588	0.15	18	3.523	0	3.523	13 x 2 = 26	91.61	2.000	183.220
	B101-14Ø	0.15 ave =1.334 0.38 max =2.513 min =0.155	0.15	14	1.864	0	1.864	36 x 2 = 72	134.21	1.210	162.394
	C101	0.15 ave =1.777 0.24 max =3.398 min =0.155	0.15	12	2.167	0	2.167	49 x 2 = 98	212.32	0.888	188.540
	D101-16Ø	0.15 ave =2.993 0.34 max =3.398 min =2.588	0.15	16	3.483	0	3.483	13 x 6 = 78	271.71	1.580	429.301
	D101-14Ø	0.15 ave =1.334 0.34 max =2.513 min =0.155	0.15	14	1.824	0	1.824	36 x 6 = 216	393.98	1.210	476.721
	A101	ave =3.644 max =6.961 min =0.328	0.15	12	3.644	0	3.644	21 x 10 = 210	765.315	0.888	679.599
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	22 x 2 = 44	50.134	0.888	44.519
	B109	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B110	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B116	0.300 3.62	as	20	3.920	0	3.920	2 x 2 = 4	15.680	2.47	38.730
	C189	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	C190	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	D135	0.300 3.62	as	16	3.920	0	3.920	2 x 3 = 6	23.520	1.58	37.162
	D136	0.300 3.62	as	16	3.920	0	3.920	2 x 3 = 6	23.520	1.58	37.162
	E300	0.300 0.200 0.300	0.15	12	0.800	0	0.800	21 x 3 = 63	50.400	0.888	44.755
									TOTAL FOR OUTLET WING WALL		**2445.041**

Station 18+719 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	3.00	0.36	0.32	0.32	0.28	26.565°			13.480	7.378
TOE WALL (OUTLET)	A205	14.220	as	14	14.220	0	14.220	20 x 1 = 20	284.400	1.21	344.124
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	90 x 1 = 90	413.100	1.21	499.851
									TOTAL FOR OUTLET TOE WALL		**843.975**

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **50201 REINFORCING STEEL (Grade 60)** Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 18+719 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	3.00	0.36	0.32	0.32	0.28	0.200	0.60	25.188	13.480	13.480

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	224.392	7,273.825
E103		125.140	
W.W		6,924.293	
A	14	1,287.730	20,814.223
C		3,862.610	
D		2,739.634	
E		1,754.597	
F		697.589	
G		1,359.980	
LONG'L		5,281.568	
E102		68.922	
H302		312.911	
W.W		3,448.683	
B	16	2,203.215	3,818.733
H300		252.800	
E.J.		366.560	
W.W		996.157	
W.W	18	361.760	361.760
W.W	20	154.918	154.918
E101	22	877.312	877.312
H301	24	421.456	421.456
	25	0.000	0.000
		TOTAL WEIGHT =	**33,722.227**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 18+719 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	3.00	0.36	0.32	0.32	0.28	0.200	0.60	25.188	13.480	13.480

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	108.651
BOTTOM SLAB	Vol. = Length * X * T1	122.232
OUTER WALLS	Vol. = Length * H * 2W1	48.361
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	63.474
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.270
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	1.213
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.252
	TOTAL VOLUME =	**344.453**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 18+719 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
4	3.00	3.00	0.36	0.32	0.32	0.28	6.036	7.378	0.250	13.480	13.480

X2	SLOPE
0.3	2.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	20.341
APRON OUTLET	Vol. = Lo * X * T	24.864
TOE WALL INLET	Vol. = XS * T * (1-T)	2.528
TOE WALL OUTLET	Vol. = XS * T * (2-T)	5.898
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	5.125
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	6.236
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	8.417
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	10.288
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.601
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.754
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.918
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	1.152
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.430
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.430
	TOTAL VOLUME =	**89.982**

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station 37 + 836.740

R. C. B. C.

RCBC	**4**	**3.00 x**	**2.50**
T1 =	0.36	W1 =	0.32
T2 =	0.32	W2 =	0.26
SSL =	2.000 =	2.3094	
SSR =	2.000 =	2.3094	
Inner Shoulder =	2.000		
Outer Shoulder =	3.000		
Shoulder Slope =	4.000		
C.L. ELEV.=	2029.589		
CULV. SLP =	0.04000		

Skew =	60 ° Left
C.W. =	7.300
H/MED. =	2.000
Layer =	0.630

t =	0.630	xleft =	3.316
skew =	60	yleft =	0.829
slope =	0.25	xright =	2.032
rd. width =	14.300	yright =	0.508
half med=	2.000		

Station 37+836.740

		PGL	S.E.						
1	37846.910	2034.869	0.06	a	17.616	b	10.170	c	20.341
2	37+844.996	2035.02	0.06	a	14.300	b	8.256	c	16.512
3	37+837.895	2035.583		a	2.000	b	1.155	c	2.309
4	37+836.740	2035.674		a		b		c	
5	37+835.585	2035.766		a	2.000	b	1.155	c	2.309
6	37+828.484	2036.327	0.06	a	14.300	b	8.256	c	16.512
7	37+827.311	2036.42	0.06	a	16.332	b	9.429	c	18.859

Station **37 + 836.740** **skew** **60°** **Left**

	S	H	T1	T2	W1	W2	TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1=P2	No. of Pane	TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.43	13.42	20.000	2	40.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1, P1=P2 20.000 m.	A	1.03 / 1.33	0.24	14	2.360	0.00	2.360	84 x 8 = 672	1585.920	1.21	1918.963
	B	4.59 / x=0.30	0.36	16	4.890	0	4.890	56 x 8 = 448	2190.720	1.58	3461.338
	C	5.62	0.18	14	5.620	0	5.620	112 x 8 = 896	5035.520	1.21	6092.979
	D	3.54	0.16	14	3.540	0	3.540	126 x 8 = 1008	3568.320	1.21	4317.667
	E	6.78	0.24	14	6.780	0	6.780	84 x 4 = 336	2278.080	1.21	2756.477
	F	x=0.25 / 3.06	0.36	14	3.560	0	3.560	56 x 4 = 224	797.440	1.21	964.902
	G	x=0.25 / 3.06	0.44	14	3.310	0	3.310	46 x 10 = 460	1522.600	1.21	1842.346
	LONG'NAL 40.000	12 / 29.580 / .l. = 60*dia.	VAR.	14	41.580	0	41.580	(59+59+13*2+6*3)*2 324	13471.920	1.21	16301.023
										SUB TOTAL =	**37655.696**

Station 37 + 836.740 **skew** 60 ₀ **Left**

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P3=P4		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.43	13.42	1.583		1.583

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P3=P4 1.583 m.	A	1.03 1.33	0.24	14	2.360	0.00	2.360	7 x 8 = 56	132.160	1.21	159.914
	B	4.59 x=0.30	0.36	16	4.890	0	4.890	5 x 8 = 40	195.600	1.58	309.048
	C	5.62	0.18	14	5.620	0	5.620	9 x 8 = 72	404.640	1.21	489.614
	D	3.54	0.16	14	3.540	0	3.540	10 x 8 = 80	283.200	1.21	342.672
	E	6.78	0.24	14	6.780	0	6.780	7 x 4 = 28	189.840	1.21	229.706
	F	x=0.25 3.06	0.36	14	3.560	0	3.560	5 x 4 = 20	71.200	1.21	86.152
	G	x=0.25 3.06	0.44	14	3.310	0	3.310	4 x 10 = 40	132.400	1.21	160.204
	P3 to P12 Top Slab max= 9.194	0 5.349 min= 1.504	VAR.	14	5.349	0	5.349	59*2 = 118	631.213	1.21	763.768
	P3 to P12 Bot. Slab max= 9.194	0 5.349 min= 1.504	VAR.	14	5.349	0	5.349	59*2 = 118	631.213	1.21	763.768
	W.W. Short NF L= 1.504	0 1.504	VAR.	14	1.504	0	1.504	7*2 = 14	21.058	1.21	25.480
	W.W. Short FF L= 1.643	0 1.643	VAR.	14	1.643	0	1.643	6 *2 = 12	19.712	1.21	23.852
	W.W. Long FF L= 9.056	0 9.056	VAR.	14	9.056	0	9.056	6 *2 = 12	108.670	1.21	131.491
	W.W. Long NF L= 9.194	0 9.194	VAR.	14	9.194	0	9.194	7*2 = 14	128.722	1.21	155.753
	W.W. Inner Short L= 3.467	0 3.467	VAR.	14	3.467	0	3.467	6*2 = 12	41.605	1.21	50.342
	W.W. Inner Mediur L= 5.349	0 5.349	VAR.	14	5.349	0	5.349	6*2 = 12	64.191	1.21	77.671
	W.W. Inner Long L= 7.231	0 7.231	VAR.	14	7.231	0	7.231	6*2 = 12	86.777	1.21	105.000
										SUB TOTAL =	**3874.436**

Station **37 + 836.740** **skew** **60°** **Left**

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P4=P8		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.43	13.42	1.992		1.992

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P4=P8 1.992 m.	A	1.03 1.33	0.24	14	2.360	0.00	2.360	8 x 8 = 64	151.040	1.21	182.758
	Avar	0.646 max=0.854 min= 0.439	0.24	14	0.646	0.00	0.65	2 x 4 = 8	5.172	1.21	6.258
	B	4.59 x=0.30	0.36	16	4.890	0	4.890	6 x 4 = 24	117.360	1.58	185.429
	Bvar.	2.493 max= 3.906 min= 1.080	0.36	16	2.493	0	2.493	6 x 4 = 24	59.837	1.58	94.543
	C	5.62	0.18	14	5.620	0	5.620	17 x 4 = 68	382.160	1.21	462.414
	C var	4.974 max=5.608 min= 4.340	0.18	14	5.608	0	5.608	5 x 4 = 20	112.152	1.21	135.704
	D	3.54	0.16	14	3.540	0	3.540	13 x 4 = 52	184.080	1.21	222.737
	Dvar	1.68 max= 3.203 min= 0.154	0.16	14	1.679	0	1.679	12 x 4 = 48	80.576	1.21	97.496
	E	6.78	0.24	14	6.780	0	6.780	7 x 4 = 28	189.840	1.21	229.706
	E	6.55	0.24	14	6.550	0	6.550	1 x 4 = 4	26.200	1.21	31.702
	F	x=0.25 3.06	0.36	14	3.560	0	3.560	6 x 2 = 12	42.720	1.21	51.691
	G	x=0.25 3.06	0.44	14	3.310	0	3.310	5 x 8 = 40	132.400	1.21	160.204
										SUB TOTAL =	**1860.643**

Station **37 + 836.740** **skew** **60 o** **Left**

TABLE 2

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	BARREL LENGTH P5=P9		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.43	13.42	1.882		1.882

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
Section 4 - 4 P5=P9 1.882 m.	A	1.03 1.33	0.24	14	2.360	0.00	2.360	8 x 8 = 64	151.040	1.21	182.758
	B	4.59 x=0.30	0.36	16	4.890	0	4.890	6 x 4 = 24	117.360	1.58	185.429
	C	5.62	0.18	14	5.620	0	5.620	6 x 4 = 24	134.880	1.21	163.205
	C var	4.879 max=5.418 min= 4.340	0.18	14	5.418	0	5.418	5 x 4 = 20	108.352	1.21	131.106
	D	3.54	0.16	14	3.540	0	3.540	12 x 4 = 48	169.920	1.21	205.603
	Evar	4.712 max= 6.134 min= 3.290	0.24	14	4.712	0	4.712	8 x 4 = 32	150.789	1.21	182.455
	F	x=0.25 3.06	0.36	14	3.560	0	3.560	6 x 2 = 12	42.720	1.21	51.691
	G	x=0.25 3.06	0.44	14	3.310	0	3.310	5 x 3 = 15	49.650	1.21	60.077
										SUB TOTAL =	**1162.323**

Station **37 + 836.740** **skew** **60** **Left**

TABLE 2

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	BARREL LENGTH P6=P10		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.43	13.42	1.882		1.882

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 5 - 5 P6=P10 1.882 m.	A	1.03 1.33	0.24	14	2.360	0.00	2.360	8 x 4 = 32	75.520	1.21	91.379
	B	4.59 x=0.30	0.36	16	4.890	0	4.890	3 x 4 = 12	58.680	1.58	92.714
	Bvar	3.693 x=0.30 max=4.076 min =3.310	0.36	16	3.993	0	3.993	3 x 4 = 12	47.915	1.58	75.706
	Cvar.	2.554 max= 4.028 min= 1.080	0.18	14	2.554	0	2.554	11 x 4 = 44	112.381	1.21	135.981
	D	3.54	0.16	14	3.540	0	3.540	12 x 4 = 48	169.920	1.21	205.603
	E	1.63 max= 2.874 min= 0.380	0.24	14	1.627	0	1.627	7 x 4 = 28	45.562	1.21	55.130
	F	x=0.25 3.06	0.36	14	3.560	0	3.560	6 x 2 = 12	42.720	1.21	51.691
	G	x=0.25 3.06	0.44	14	3.310	0	3.310	5 x 4 = 20	66.200	1.21	80.102
										SUB TOTAL =	**788.307**

Station **37 + 836.740** **skew** **60** **Left**

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P7=P11		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.43	13.42	1.992		1.992

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 6 - 6 P7=P11 1.992 m.	A	1.03 1.33	0.24	14	2.360	0.00	2.36	4 x 4 = 16	37.760	1.21	45.690
	A	1.03 0.82 max=1.232 min = 0.40	0.24	14	1.846	0.00	1.85	3 x 4 = 12	22.150	1.21	26.801
	B	1.439 x=0.30 max=2.686 min=0.192	0.36	16	1.739	0	1.739	5 x 4 = 20	34.787	1.58	54.964
	D	1.647 max=3.033 min=0.262	0.16	14	1.647	0	1.647	11 x 4 = 44	72.478	1.21	87.698
	F	x=0.25 3.06	0.36	14	3.56	0	3.56	6 x 2 = 12	42.720	1.21	51.691
	G	x=0.25 3.06	0.44	14	3.31	0	3.31	5 x 2 = 10	33.100	1.21	40.051
										SUB TOTAL =	**306.896**

Station **37 + 836.740** **skew** **60** Left

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIN	WC	TL		X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.20	0.65		13.420	15.496

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.439 0 24	0.3	12	1.558	0	1.558	45 x 4 = 180	280.363	0.888	248.962
	E101	16.724	-	22	16.724	0	16.724	10 x 2 = 20	334.47	2.980	996.733
	E102	16.244	-	14	16.244	0	16.244	2 x 2 = 4	64.97	1.21	78.620
	E103	0.156 0.34 0.24 0.15	0.2	12	1.036	0	1.036	68 x 2 = 136	140.92	0.888	125.140
END BARREL KEY	H301	16.844	-	24	16.844	0	16.844	4 x 2 = 8	134.750	3.550	478.362
	H302	0.370 0.467 0.33 0.370	0.15	14	1.536	0	1.536	90 x 2 = 180	276.426	1.210	334.475
	H300 *WALL*	0.924 dowel	0.3	16	0.924	0	0.924	9 x 10 = 90	83.14	1.580	131.359
	H300 *BOT.SLAB*	0.924 dowel	0.15	16	0.924	0	0.924	90 x 2 = 180	166.28	1.580	262.717
	WALL *EXP. JT.*	0.924 dowel	0.3	16	0.924	0	0.924	9 x 10 = 90	83.14	1.580	131.359
	Top & Bot. *EXP. JT.*	0.924 dowel	0.15	16	0.924	0	0.924	180 x 2 = 360	332.55	1.580	525.434
										SUB TOTAL =	**3313.161**

Station **37 + 836.740** **skew** **60 ° INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP	BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41309°	2.29060°	13.420	5.962

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	16.221	as	14	16.221	0.00	16.221	2 x 1 = 2	32.441	1.21	39.254
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	90 x 1 = 90	142.931	1.21	172.947
	A100	5.847	as	12	5.847	0	5.847	6 x 5 = 30	175.396	0.888	155.752
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	30 x 2 = 60	116.052	1.21	140.422
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	30 x 3 = 90	155.555	1.21	188.221
	F300 G300	5.847	0.15	12	5.847	0	5.847	80 x 2 = 160	935.445	0.888	830.675
	L3 F301	ave =5.450 x=0.15 max = 10.127 min =0.773	0.2	12	5.600	0	5.600	28 x 2 = 56	313.601	0.888	278.478
	L3 G301	ave =5.450 x=0.15 max =10.127 min =0.773	0.2	12	5.600	0	5.600	28 x 2 = 56	313.601	0.888	278.478
	L4 F301	10.127	0.2	12	10.127	0	10.127	9 x 1 = 9	91.139	0.888	80.931
	L4 G301	10.127	0.2	12	10.127	0	10.127	9 x 1 = 9	91.139	0.888	80.931
									TOTAL FOR INLET APRON		**2246.089**

Station **37 + 836.740** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	-2.29060°		13.420	5.962

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.420	as	12	6.420	0	6.420	2 x 5 = 10	64.203	0.888	57.012
	B101-18Ø	0.15 ave =2.478 0.38 max =2.903 min =2.052	0.15	18	3.008	0	3.008	13 x 2 = 26	78.20	2.000	156.393
	B101-14Ø	0.15 ave =1.072 0.38 max =1.987 min =0.158	0.15	14	1.602	0	1.602	27 x 2 = 54	86.53	1.210	104.707
	C101	0.15 ave =1.531 0.24 max =2.903 min =0.158	0.15	12	1.921	0	1.921	40 x 2 = 80	153.65	0.888	136.445
	D101-16Ø	0.15 ave =2.478 0.32 max =2.903 min =2.052	0.15	16	2.948	0	2.948	13 x 6 = 78	229.91	1.580	363.257
	D101-14Ø	0.15 ave =1.072 0.32 max =1.987 min =0.158	0.15	14	1.542	0	1.542	27 x 6 = 162	249.88	1.210	302.359
	A101	ave =2.977 max =5.560 min =0.395	0.15	12	2.977	0	2.977	17 x 10 = 170	506.143	0.888	449.455
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR INLET WING WALL		**1791.820**

Station **37 + 836.740** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.413°			13.420	5.962
TOE WALL (INLET)	A205	16.221	as	14	16.221	0	16.221	10 x 1 = 10	162.206	1.21	196.269
	A203	0.173 0.774 0.800 0.196	0.15	14	2.743	0	2.743	104 x 1 = 104	285.288	1.21	345.198
									TOTAL FOR INLET TOE WALL		**541.467**

Station **37 + 836.740** **skew** **60 ° OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		13.420	7.175

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	16.221	as	14	16.221	0.00	16.221	2 x 1 = 2	32.441	1.21	39.254
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	90 x 1 = 90	142.931	1.21	172.947
	A100	7.060	as	12	7.060	0	7.060	6 x 5 = 30	211.786	0.888	188.066
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	36 x 2 = 72	139.262	1.21	168.507
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	36 x 3 = 108	186.666	1.21	225.865
	F300 G300	7.060	0.15	12	7.060	0	7.060	80 x 2 = 160	1129.525	0.888	1003.018
	L3 F301	ave =6.512 x=0.15 max =12.228 min =0.796	0.2	12	6.662	0	6.662	34 x 2 = 68	453.001	0.888	402.265
	L3 G301	ave =6.512 x=0.15 max =12.228 min =0.796	0.2	12	6.662	0	6.662	34 x 2 = 68	453.001	0.888	402.265
	L4 F301	12.948	0.2	12	12.948	0	12.948	3 x 1 = 3	38.843	0.888	34.492
	L4 G301	12.948	0.2	12	12.948	0	12.948	3 x 1 = 3	38.843	0.888	34.492
									TOTAL FOR OUTLET APRON		**2671.171**

Station 37 + 836.740 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		13.420	7.175

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.533	as	12	7.533	0	7.533	2 x 5 = 10	75.328	0.888	66.891
	B101-18Ø	0.15 ave =2.550 0.38 max =2.903 min =2.196	0.15	18	3.080	0	3.080	13 x 2 = 26	80.07	2.000	160.137
	B101-14Ø	0.15 ave =1.141 0.38 max =2.131 min =0.151	0.15	14	1.671	0	1.671	35 x 2 = 70	116.96	1.210	141.524
	C101	0.15 ave =1.527 0.24 max =2.903 min =0.151	0.15	12	1.917	0	1.917	48 x 2 = 96	184.04	0.888	163.427
	D101-16Ø	0.15 ave =2.550 0.32 max =2.903 min =2.196	0.15	16	3.020	0	3.020	13 x 6 = 78	235.53	1.580	372.130
	D101-14Ø	0.15 ave =1.141 0.32 max =2.131 min =0.151	0.15	14	1.611	0	1.611	35 x 6 = 210	338.31	1.210	409.355
	A101	ave =3.551 max =6.707 min =0.395	0.15	12	3.551	0	3.551	17 x 10 = 170	603.678	0.888	536.066
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR OUTLET WING WALL		**2071.723**

Station 37 + 836.740 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL X1	APRON L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.413°			13.420	7.175
TOE WALL (OUTLET)	A205	16.221	as	14	16.221	0	16.221	20 x 1 = 20	324.412	1.21	392.538
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	104 x 1 = 104	493.288	1.21	596.878
									TOTAL FOR OUTLET TOE WALL		**989.417**

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **50201 REINFORCING STEEL (Grade 60)** Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 37 + 836.740 skew 60° Left

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.000	2.500	0.360	0.320	0.320	0.260	0.200	0.650	50.914	13.420	15.496

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	248.962	5,732.783
E103		125.140	
W.W.		5,358.681	
A	14	2,614.522	45,238.470
C		7,611.003	
D		5,479.477	
E		3,485.176	
F		1,257.819	
G		2,342.984	
LONG'L		18,398.149	
E102		78.620	
H302		334.475	
W.W.		3,636.246	
B	16	4,459.171	6,375.112
H300		394.076	
E.J.		656.793	
W.W.		865.073	
W.W.	18	316.530	316.530
W.W.	20	135.158	135.158
E101	22	996.733	996.733
H301	24	478.362	478.362
	25	0.000	0.000
		TOTAL WEIGHT =	**59,273.149**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37 + 836.740 skew 60° Left

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.65	50.914	13.420	15.496

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	0.000
BOTTOM SLAB	Vol. = Length * X * T1	0.000
OUTER WALLS	Vol. = Length * H * 2W1	0.000
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	0.000
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.000
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.000
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.000
	TOTAL VOLUME =	**0.000**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37 + 836.740 skew 60° Left

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	5.962	7.175	0.250	13.420	15.496

X2	SLOPE
0.29	2.309 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	20.003
APRON OUTLET	Vol. = Lo * X * T	24.072
TOE WALL INLET	Vol. = XS * T * (1-T)	2.906
TOE WALL OUTLET	Vol. = XS * T * (2-T)	6.780
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	4.204
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	5.038
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	6.557
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	7.891
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.593
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.731
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.874
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	1.078
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.643
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.643
	TOTAL VOLUME =	**84.013**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station **37+836.746**

RCBC **4 - 3.00 x 2.50**

R. C. B. C.

T1 = 0.36 W1 = 0.32
T2 = 0.32 W2 = 0.26
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2023.000
B.C. slope = 0.00855

Skew = 90 ° Normal
P.G.L. = 2026.677
SL = 0.029853 SR = 0.031966
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station **37+836.746** **Skew =** **90 °** **Normal**

	S	H	T1	T2	W1	W2	NON-STANDARD		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SLOPE	X	P1	No. of Pane	TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.50	13.42	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	1	2.37 / 3.08 / 2.37	0.15	20	7.820	0	7.820	134 x 2 = 268	2095.76	2.47	5176.527
	2	x=0.24 / 4.00	0.15	20	4.480	0	4.480	134 x 2 = 268	1200.64	2.47	2965.581
	3	3.40 / x=0.28	0.15	14	3.960	0	3.960	134 x 2 = 268	1061.280	1.21	1284.149
	4	3.08 / x=0.25	0.15	14	3.580	0	3.580	134 x 2 = 268	959.44	1.21	1160.922
	Top SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	68 x 1 = 68	1402.160	0.888	1245.118
	WALLS 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	14 x 20 = 280	5773.600	0.888	5126.957
	BOT SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	68 x 2 = 136	2804.320	0.888	2490.236
	TOP SLAB 6 20.000	12 / 8.740 / O.L.=60*Ø	0.20	14	20.740	0	20.740	68 x 1 = 68	1410.320	1.210	1706.487
	7	4.460	0.15	20	4.460	0	4.460	134 x 3 = 402	1792.920	2.470	4428.512
	8	4.460	0.15	20	4.460	0	4.460	134 x 3 = 402	1792.920	2.470	4428.512
	9	3.08 / x=0.40	0.15	16	3.880	0	3.880	134 x 6 = 804	3119.520	1.580	4928.842
	10	7.720	0.15	20	7.720	0	7.720	134 x 1 = 134	1034.480	2.470	2555.166
	11	7.240	0.15	12	7.240	0	7.240	134 x 1 = 134	970.160	0.888	861.502
										SUB TOTAL =	**38358.512**

Station 37+836.746 **Skew = 90** **Normal**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P2		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26		13.42	14.6170		14.6170

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 14.617 m.	1	2.37 3.08 2.37	0.15	20	7.820	0	7.820	98 x 2 = 196	1532.72	2.47	3785.818
	2	x=0.24 4.00	0.15	20	4.480	0	4.480	98 x 2 = 196	878.08	2.47	2168.858
	3	3.40 x=0.28	0.15	14	3.960	0	3.960	98 x 2 = 196	776.160	1.21	939.154
	4	3.08 x=0.25	0.15	14	3.580	0	3.580	98 x 2 = 196	701.68	1.21	849.033
	Top SLAB 5 14.617	12 3.237 O.L.=60*Ø	0.20	12	15.237	0	15.237	68 x 1 = 68	1036.116	0.888	920.071
	WALLS 5 14.617	12 3.237 O.L.=60*Ø	0.20	12	15.237	0	15.237	68 x 2 = 136	2072.232	0.888	1840.142
	BOT SLAB 5 14.617	12 3.237 O.L.=60*Ø	0.20	12	15.237	0	15.237	14 x 10 = 140	2133.180	0.888	1894.264
	TOP SLAB 6 14.617	12 3.357 O.L.=60*Ø	0.20	14	15.357	0	15.357	68 x 1 = 68	1044.276	1.210	1263.574
	7	4.460	0.15	20	4.460	0	4.460	98 x 3 = 294	1311.240	2.470	3238.763
	8	4.460	0.15	20	4.460	0	4.460	98 x 3 = 294	1311.240	2.470	3238.763
	9	3.08 x=0.40	0.15	16	3.880	0	3.880	98 x 6 = 588	2281.440	1.580	3604.675
	10	7.720	0.15	20	7.720	0	7.720	98 x 1 = 98	756.560	2.470	1868.703
	11	7.240	0.15	12	7.240	0	7.240	98 x 1 = 98	709.520	0.888	630.054
										SUB TOTAL =	**26241.871**

Station **37+836.746** **skew** **90** Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIN	WC	TL		X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.20	0.60		13.420	13.420

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.347 0.24	0.3	12	1.373	0	1.373	45 x 4 = 180	247.200	0.888	219.514
	E101	14.660	-	22	14.660	0	14.660	10 x 2 = 20	293.20	2.980	873.736
	E102	14.180	-	14	14.180	0	14.180	2 x 2 = 4	56.72	1.21	68.631
	E103	0.156 0.34 0.24 0.15	0.2	12	1.036	0	1.036	68 x 2 = 136	140.92	0.888	125.140
	H301	14.780	-	24	14.780	0	14.780	4 x 2 = 8	118.240	3.550	419.752
	H302	0.320 0.467 0.33 0.320	0.15	14	1.437	0	1.437	90 x 2 = 180	258.604	1.210	312.911
	H300 *WALL*	0.800 dowel	0.3	16	0.800	0	0.800	9 x 10 = 90	72.00	1.580	113.760
	H300 *BOT.SLAB*	0.800 dowel	0.15	16	0.800	0	0.800	90 x 2 = 180	144.00	1.580	227.520
	WALL *EXP. JT.*	0.800 dowel	0.3	16	0.800	0	0.800	9 x 10 = 90	72.00	1.580	113.760
	Top & Bot. *EXP. JT.*	0.800 dowel	0.15	16	0.800	0	0.800	180 x 2 = 360	288.00	1.580	455.040
										SUB TOTAL =	**2929.764**

Station **37+836.746** **skew** **90 °** **INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		13.420	5.545

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	14.160	as	14	14.160	0.00	14.160	2 x 1 = 2	28.320	1.21	34.267
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	90 x 1 = 90	120.032	1.21	145.239
	A100	5.445	as	12	5.445	0	5.445	6 x 5 = 30	163.350	0.888	145.055
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	28 x 2 = 56	101.555	1.21	122.882
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	28 x 3 = 84	133.305	1.21	161.299
	F300 G300	5.445	0.15	12	5.445	0	5.445	80 x 2 = 160	871.200	0.888	773.626
	L4 F301	14.180 x=0.15	0.15	14	14.480	0	14.480	37 x 1 = 37	535.760	1.21	648.270
	L4 G301	14.180 x=0.15	0.15	12	14.480	0	14.480	37 x 1 = 37	535.760	0.888	475.755
									TOTAL FOR INLET APRON		**2506.392**

Station 37+836.746 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	-0.49004°		13.420	5.545

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.047	as	12	6.047	0	6.047	2 x 5 = 10	60.468	0.888	53.695
	B101-18Ø	0.15 ave =2.437 0.38 max =2.894 min =1.979	0.15	18	2.967	0	2.967	13 x 2 = 26	77.13	2.000	154.259
	B101-14Ø	0.15 ave =1.032 0.38 max =1.904 min =0.160	0.15	14	1.562	0	1.562	24 x 2 = 48	74.97	1.210	90.712
	C101	0.15 ave =1.527 0.24 max =2.894 min =0.160	0.15	12	1.917	0	1.917	37 x 2 = 74	141.86	0.888	125.972
	D101-16Ø	0.15 ave =2.437 0.32 max =2.894 min =1.979	0.15	16	2.907	0	2.907	13 x 6 = 78	226.71	1.580	358.198
	D101-14Ø	0.15 ave =1.032 0.32 max =1.904 min =0.160	0.15	14	1.502	0	1.502	24 x 6 = 144	216.29	1.210	261.708
	A101	ave =2.743 max =5.159 min =0.328	0.15	12	2.743	0	2.743	17 x 10 = 170	466.381	0.888	414.146
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR INLET WING WALL		**1679.112**

Station 37+836.746 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			13.420	5.545
TOE WALL (INLET)	A205	14.160	as	14	14.160	0	14.160	10 x 1 = 10	141.600	1.21	171.336
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0 NON-NORMAL 4 Cells	2.590	90 x 1 = 90	233.100	1.21	282.051
									TOTAL FOR INLET TOE WALL		**453.387**

Station **37+836.746** **skew** **90 °** **OUTLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		13.420	5.738

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	14.160	as	14	14.160	0.00	14.160	2 x 1 = 2	28.320	1.21	34.267
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	90 x 1 = 90	120.032	1.21	145.239
	A100	5.638	as	12	5.638	0	5.638	6 x 5 = 30	169.140	0.888	150.196
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	29 x 2 = 58	105.182	1.21	127.270
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	29 x 3 = 87	138.066	1.21	167.060
	F300 G300	5.638	0.15	12	5.638	0	5.638	80 x 2 = 160	902.080	0.888	801.047
	L4 F301	14.180 x=0.15	0.15	14	14.480	0	14.480	39 x 1 = 39	564.720	1.21	683.311
	L4 G301	14.180 x=0.15	0.15	12	14.480	0	14.480	39 x 1 = 39	564.720	0.888	501.471
										TOTAL FOR OUTLET APRON	**2609.862**

Station 37+836.746 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		13.420	5.738

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.219	as	12	6.219	0	6.219	2 x 5 = 10	62.190	0.888	55.224
	B101-18Ø	0.15 ave =2.452 0.38 max =2.894 min =2.010	0.15	18	2.982	0	2.982	13 x 2 = 26	77.53	2.000	155.059
	B101-14Ø	0.15 ave =1.046 0.38 max =1.935 min 0.158	0.15	14	1.576	0	1.576	25 x 2 = 50	78.82	1.210	95.376
	C101	0.15 ave =1.526 0.24 max =2.894 min =0.158	0.15	12	1.916	0	1.916	38 x 2 = 76	145.64	0.888	129.325
	D101-16Ø	0.15 ave =2.452 0.32 max =2.894 min =2.010	0.15	16	2.922	0	2.922	13 x 6 = 78	227.91	1.580	360.096
	D101-14Ø	0.15 ave =1.046 0.32 max =1.935 min =0.158	0.15	14	1.516	0	1.516	25 x 6 = 150	227.40	1.210	275.154
	A101	ave =2.835 max =5.341 min =0.328	0.15	12	2.835	0	2.835	17 x 10 = 170	481.879	0.888	427.909
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR OUTLET WING WALL		**1718.564**

Station 37+836.746 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			13.420	5.738

TOE WALL (OUTLET)	A205	14.160	as	14	14.160	0	14.160	20 x 1 = 20	283.200	1.21	342.672
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0 NON-NORMAL	4.590	90 x 1 = 90	413.100	1.21	499.851
						4 Cells			**TOTAL FOR OUTLET TOE WALL**		**842.523**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 37+836.746 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.20	0.60	34.617	13.420	13.420

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
05	12	13,516.788	20,913.998
11		1,491.556	
S100		219.514	
E103		125.140	
W.W.		5,561.001	
03	14	2,223.302	10,541.244
04		2,009.955	
06		2,970.061	
E102		68.631	
H302		312.911	
W.W.		2,956.383	
09	16	8,533.517	10,291.577
H300		341.280	
E.J.		568.800	
W.W.		847.980	
W.W.	18	309.318	309.318
01	20	8,962.346	33,990.362
02		5,134.438	
07		7,667.275	
08		7,667.275	
10		4,423.869	
W.W.		135.158	
E101	22	873.736	873.736
H301	24	419.752	419.752
	25	0.000	0.000
		TOTAL WEIGHT =	**77,339.987**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37+836.746 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60	34.617	13.420	13.420

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	148.659
BOTTOM SLAB	Vol. = Length * X * T1	167.242
OUTER WALLS	Vol. = Length * H * 2W1	55.387
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	67.503
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.268
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	1.208
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.346
	TOTAL VOLUME =	**440.613**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37+836.746 skew 90° Normal

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	5.545	5.738	0.250	13.420	13.420

X2	SLOPE
0.29	2.000: 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	18.603
APRON OUTLET	Vol. = Lo * X * T	19.251
TOE WALL INLET	Vol. = XS * T * (1-T)	2.516
TOE WALL OUTLET	Vol. = XS * T * (2-T)	5.871
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	3.915
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	4.047
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	6.098
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	6.311
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.545
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.567
KEY BLOCKS INNER W.W. INLET	ol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.804
KEY BLOCKS INNER W.W. OUTLET	ol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.836
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.423
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.423
	TOTAL VOLUME =	**72.210**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station 44 + 298.920

R. C. B. C.

RCBC	**4**	**3.00 x**	**2.50**
T1 =	0.36	W1 =	0.32
T2 =	0.32	W2 =	0.26
SSL =	2.000 =	2.3094	
SSR =	2.000 =	2.3094	
Inner Shoulder =	2.000		
Outer Shoulder =	3.000		
Shoulder Slope =	4.000		
C.L. ELEV.=	2023.123		
CULV. SLP =	0.04000		

Skew =	60 °	Left	
C.W. =	7.300		
H/MED. =	2.000		
Layer =	0.630		

t =	0.630	xleft =	2.921
skew =	60	yleft =	0.727
slope =	0.25	xright =	2.203
rd. width =	14.300	yright =	0.551
half med=	2.000		

Station 44+298.920

		PGL	S.E.						
1	44308.863	2026.675	0.03324079	a	17.221	b	9.943	c	19.885
2	44+307.176	2026.674	0.0343451	a	14.300	b	8.256	c	16.512
3	44+300.075	2026.676		a	2.000	b	1.155	c	2.309
4	44+298.920	2026.677		a		b		c	
5	44+297.765	2026.678		a	2.000	b	1.155	c	2.309
6	44+290.664	2026.689	0.036	a	14.300	b	8.256	c	16.512
7	44+289.392	2026.691	0.036	a	16.503	b	9.528	c	19.056

Station 44 + 298.920 Skew = 60 ° Left

CELL NO.	S SPAN	H HEIGHT	T1 BOT.SLAB	T2 TOP SLAB	W1 EXT.WALL	W2 IN. WALL	NON-STANDARD SLOPE	NON-STANDARD X	BARREL LENGTH P1	No. of Pane	TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.43	13.42	20.000	1	20.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	1	2.37 / 3.08 / 2.37	0.15	20	7.82	0	7.82	134 x 2 = 268	2095.76	2.47	5176.527
	2	x=0.24 / 4.00	0.15	20	4.24	0	4.24	134 x 2 = 268	1136.32	2.47	2806.710
	3	3.40 / x=0.28	0.15	14	3.68	0	3.68	134 x 2 = 268	986.240	1.21	1193.350
	4	3.08 / x=0.25	0.15	14	3.58	0	3.58	134 x 2 = 268	959.44	1.21	1160.922
	Top SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	68 x 1 = 68	1402.160	0.888	1245.118
	WALLS 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	14 x 20 = 280	5773.600	0.888	5126.957
	BOT SLAB 5 20.000	12 / 8.620 / O.L.=60*Ø	0.20	12	20.620	0	20.620	68 x 2 = 136	2804.320	0.888	2490.236
	TOP SLAB 6 20.000	12 / 8.740 / O.L.=60*Ø	0.20	14	20.740	0	20.740	68 x 1 = 68	1410.320	1.210	1706.487
	7	4.460	0.15	20	4.460	0	4.460	134 x 3 = 402	1792.920	2.470	4428.512
	8	4.460	0.15	20	4.460	0	4.460	134 x 3 = 402	1792.920	2.470	4428.512
	9	3.08 / x=0.40	0.15	16	3.880	0	3.880	134 x 6 = 804	3119.520	1.580	4928.842
	10	7.980	0.15	20	7.980	0	7.980	134 x 1 = 134	1069.320	2.470	2641.220
	11	7.500	0.15	12	7.500	0	7.500	134 x 1 = 134	1005.000	0.888	892.440
								NON-SKEW 4 Cells		**SUB TOTAL =**	**38225.835**

Station 44 + 298.920 **Skew =** 60 **Left**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P2=P3		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26		13.42	5.966		5.9655

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2=P3 5.966 m.	1	2.37 / 3.08 / 2.37	0.15	20	7.82	0	7.82	40 x 4 = 160	1251.20	2.47	3090.464
	2	x=0.24 / 4.00	0.15	20	4.24	0	4.24	40 x 4 = 160	678.4	2.47	1675.648
	3	3.40 / x=0.28	0.15	14	3.68	0	3.68	40 x 4 = 160	588.800	1.21	712.448
	4	3.08 / x=0.25	0.15	14	3.58	0	3.58	40 x 4 = 160	572.8	1.21	693.088
	Top SLAB 5 13.576	10.09 max= 14.296 min= 5.887	0.2	12	10.092	0	10.092	68 x 2 = 136	1372.446	0.888	1218.732
	Bot. SLAB 5 13.576	10.09 max= 14.296 min= 5.887	0.2	12	10.092	0	10.092	68 x 4 = 272	2744.892	0.888	2437.464
	EXT.WALL Short NF L= 5.887	0 / 5.887	0.20	12	5.887	0	5.887	14 x 2 28	164.826	0.888	146.365
	EXT.WALL Short FF L= 6.025	0 / 6.025	0.20	12	6.025	0	6.025	14 x 2 28	168.706	0.888	149.811
	EXT.WALL Long FF L= 14.158	12 / 2.158	0.20	12	14.158	0	14.158	14 x 2 28	396.433	0.888	352.033
	EXT.WALL Long NF L= 14.297	12 / 2.297	0.20	12	14.297	0	14.297	14 x 2 28	400.316	0.888	355.481
	INN..WALL SR-Short L= 7.792	0 / 7.792	0.20	12	7.792	0	7.792	14 x 2 28	218.173	0.888	193.737
	INN..WALL SR-Long L= 7.907	0 / 7.907	0.20	12	7.907	0	7.907	14 x 2 28	221.406	0.888	196.608
	INN..WALL MED-Short L= 9.674	0 / 9.674	0.20	12	9.674	0	9.674	14 x 2 28	270.873	0.888	240.535
	INN..WALL MED-Long L= 9.789	0 / 9.789	0.20	12	9.789	0	9.789	14 x 2 28	274.106	0.888	243.406
	INN..WALL LR-Short L= 11.556	0 / 11.556	0.20	12	11.556	0	11.556	14 x 2 28	323.573	0.888	287.333
	INN..WALL LR-Long L= 11.672	0 / 11.672	0.20	12	11.672	0	11.672	14 x 2 28	326.806	0.888	290.204
	Top SLAB 6 13.576	10.15 max= 14.416 min= 5.887	0.2	14	10.152	0	10.152	68 x 2 = 136	1380.606	1.210	1670.533
	7	4.460	0.15	20	4.460	0	4.460	40 x 6 = 240	1070.400	2.470	2643.888
	8	4.460	0.15	20	4.460	0	4.460	40 x 6 = 240	1070.400	2.470	2643.888
	9	3.08 / x=0.40	0.15	16	3.880	0	3.880	40 x 12 = 480	1862.400	1.580	2942.592
	10	7.980	0.15	20	7.980	0	7.980	40 x 2 = 80	638.400	2.470	1576.848
	11	7.500	0.15	12	7.500	0	7.500	40 x 2 = 80	600.000	0.888	532.800
										SUB TOTAL =	**24293.907**

Station **44 + 298.920** **Skew =** **60** **Left**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P4=P8		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26		13.42	1.992		1.992

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P4=P8 1.992 m.	1	2.37 3.08 2.37	0.15	20	7.820	0	7.820	13 x 2 = 26	203.32	2.47	502.200
	2	3.52	0.15	20	3.520	0	3.520	13 x 2 = 26	91.52	2.47	226.054
	2	x=0.24 3.53	0.15	20	3.770	0	3.770	13 x 2 = 26	98.02	2.47	242.109
	2var.	x=0.24 1.755 max = 3.22 min = 0.29	0.15	20	1.995	0	1.995	12 x 2 = 24	47.880	2.47	118.264
	3	3.52	0.15	14	3.520	0	3.520	13 x 2 = 26	91.520	1.21	110.739
	3	3.53 x=0.28	0.15	14	3.810	0	3.810	13 x 2 = 26	99.060	1.21	119.863
	3var	2.015 0.38 0.25 0.370 0.537 max = 3.220 min = 0.809	0.15	16	3.552	0	3.552	10 x 2 = 20	71.034	1.58	112.234
	3	0.55 0.38 0.370 0.255	0.15	16	1.554	0	1.554	1 x 2 = 2	3.108	1.58	4.910
	3	0.29 0.38 0.290	0.15	16	0.960	0	0.960	1 x 2 = 2	1.919	1.58	3.032
	4	3.08 x=0.25	0.15	14	3.580	0	3.580	13 x 2 = 26	93.08	1.21	112.627
	7	4.460	0.15	20	4.460	0	4.460	13 x 6 = 78	347.880	2.470	859.264
	7 var	3.725 max = 5.32 min = 2.13	0.15	20	3.725	0	3.725	13 x 2 = 26	96.852	2.470	239.226
	8	4.460	0.15	20	4.460	0	4.460	13 x 4 = 52	231.920	2.470	572.842
	8 var	3.725 max = 5.32 min = 2.13	0.15	20	3.725	0	3.725	13 x 2 = 26	96.852	2.470	239.226
	9	3.08 x=0.40	0.15	16	3.880	0	3.880	13 x 12 = 156	605.280	1.580	956.342
	10	3.520	0.15	20	3.520	0	3.520	13 x 2 = 26	91.520	2.470	226.054
	11	3.520	0.15	12	3.520	0	3.520	13 x 2 = 26	91.520	0.888	81.270
										SUB TOTAL =	**4726.257**

Station 44 + 298.920 Skew = 60 Left

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P5=P9		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26		13.42	1.882		1.882

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 4 - 4 P5=P9 1.882 m.	1	2.37 3.08 2.37	0.15	20	7.820	0	7.820	13 x 2 = 26	203.32	2.47	502.200
	2	x=0.24 3.53	0.15	20	3.770	0	3.770	13 x 2 = 26	98.02	2.47	242.109
	2var.	x=0.24 1.755 max = 3.22 min = 0.29	0.15	20	1.995	0	1.995	13 x 2 = 26	51.870	2.47	128.119
	3	3.53 x=0.28	0.15	14	3.810	0	3.810	13 x 2 = 26	99.060	1.21	119.863
	3var.	2.015 0.38 0.25 0.370 0.537 max = 3.22 min = 0.81	0.15	16	3.552	0	3.552	11 x 2 = 22	78.138	1.58	123.458
	3	0.55 0.38 0.370 0.255	0.15	16	1.554	0	1.554	1 x 2 = 2	3.108	1.58	4.910
	3	0.29 0.38 0.290	0.15	16	0.960	0	0.960	1 x 2 = 2	1.919	1.58	3.032
	4	3.08 x=0.25	0.15	14	3.580	0	3.580	13 x 2 = 26	93.08	1.21	112.627
	7	4.460	0.15	20	4.460	0	4.460	13 x 2 = 26	115.960	2.470	286.421
	7 var	3.725 max = 5.32 min = 2.13	0.15	20	3.725	0	3.725	13 x 2 = 26	96.852	2.470	239.226
	8	4.460	0.15	20	4.460	0	4.460	13 x 2 = 26	115.960	2.470	286.421
	8 var	3.725 max = 5.32 min = 2.13	0.15	20	3.725	0	3.725	13 x 2 = 26	96.852	2.470	239.226
	9	3.08 x=0.40	0.15	16	3.880	0	3.880	13 x 8 = 104	403.520	1.580	637.562
	10	3.520	0.15	20	3.520	0	3.520	13 x 2 = 26	91.520	2.470	226.054
	11	3.520	0.15	12	3.520	0	3.520	13 x 2 = 26	91.520	0.888	81.270
										SUB TOTAL =	**3232.498**

Station 44 + 298.920 Skew = 60 Left

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P6 = P10		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26		13.42	1.882		1.8822

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
P6 = P10 1.882 m SECTION 5 - 5	1	2.37 3.08 2.37	0.15	20	7.820	0	7.820	13 x 2 = 26	203.320	2.47	502.200
	2	x=0.24 3.53	0.15	20	3.770	0	3.770	13 x 2 = 26	98.020	2.47	242.109
	2var.	x=0.24 1.755 max = 3.22 min = 0.29	0.15	20	1.995	0	1.995	13 x 2 = 26	51.870	2.47	128.119
	3	3.53 x=0.28	0.15	14	3.810	0	3.810	13 x 2 = 26	99.060	1.21	119.863
	3var.	2.015 0.38 0.25 0.370 0.537 max = 3.22 min = 0.81	0.15	16	3.552	0	3.552	11 x 2 = 22	78.138	1.58	123.458
	3	0.55 0.38 0.370 0.255	0.15	16	1.554	0	1.554	1 x 2 = 2	3.108	1.58	4.910
	3	0.29 0.38 0.290	0.15	16	0.960	0	0.960	1 x 2 = 2	1.919	1.58	3.032
	4	3.08 x=0.25	0.15	14	3.58	0	3.58	13 x 2 = 26	93.08	1.21	112.627
	7 var	3.725 max = 5.32 min = 2.13	0.15	20	3.725	0	3.725	13 x 2 = 26	96.852	2.470	239.226
	8 var	3.725 max =5.320 min =2.130	0.15	16	3.725	0	3.725	13 x 2 = 26	96.852	1.580	153.027
	9	3.08 x=0.40	0.15	16	3.880	0	3.880	5 x 4 = 20	77.600	1.580	122.608
										SUB TOTAL =	**1751.179**

Station 44 + 298.920 Skew = 60 Left

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	NON-STANDARD	X	BARREL LENGTH P7 = P11		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26		13.42	1.992		1.9918

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 6 - 6 P7 = P11 1.992 m.	1 up	1.611 0.24 2.12 max = 3.04 min = 0.182	0.15	20	3.971	0	3.971	12 x 2 = 24	95.31	2.47	235.415
	1 down	2.16 1.611 max = 3.04 min =0.182	0.15	20	3.771	0	3.771	12 x 2 = 24	90.51	2.47	223.559
	2 var	x=0.24 1.611 max = 3.04 min =0.182	0.15	20	2.091	0	2.091	12 x 2 = 24	50.190	2.47	123.969
	3 var	1.871 0.38 0.25 0.370 0.28 0.537 max = 3.04 min =0.702	0.15	16	3.688	0	3.688	10 x 2 = 20	73.759	1.58	116.539
	3	0.442 0.38 0.370 0.28 0.103	0.15	16	1.574	0	1.574	1 x 2 = 2	3.149	1.58	4.975
	3	0.182 0.38 0.182 0.28	0.15	16	1.025	0	1.025	1 x 2 = 2	2.049	1.58	3.238
	4	3.08 x=0.25	0.15	12	3.58	0	3.58	12 x 2 = 24	85.92	0.888	76.297
										SUB TOTAL =	**783.992**

Station **44 + 298.920** **Skew =** **60** Left

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS		X	xs
4	3.00	2.50	0.32	0.26	0.36	0.231	0.85	0.32		13.420	15.496

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	B01	16.881 O.L.=60*Ø	-	25	16.881	0	16.881	10 x 2 = 20	337.61	2.000	675.225
	B02	0.770 0.24	0.2	12	2.220	0	2.220	68 x 2 = 136	301.920	0.888	268.105
	B03	0.154 0.24	0.2	10	0.988	0	0.988	68 x 4 = 272	268.736	0.617	165.810
	B04	16.701 O.L.=60*Ø	-	22	16.701	0	16.701	6 x 2 = 12	200.407	1.210	242.493
	Y12	16.101 O.L.=60*Ø	-	12	16.101	0	16.101	2 x 2 = 4	64.40	0.888	57.189
	Y12-200	0.165 0.34 0.24 0.15	0.2	12	1.045	0	1.045	68 x 2 = 136	142.09	0.888	126.179
	H300 *WALL*	0.924 dowel	0.3	16	0.924	0	0.924	9 x 10 = 90	83.14	1.580	131.359
	H300 *BOT.SLAB*	0.924 dowel	0.15	16	0.924	0	0.924	90 x 2 = 180	166.28	1.580	262.717
	WALL *EXP. JT.*	0.80 dowel	0.3	16	0.800	0	0.800	9 x 10 = 90	72.00	1.580	113.760
	Top & Bot. *EXP. JT.*	0.80 dowel	0.15	16	0.800	0	0.800	180 x 2 = 360	288.00	1.580	455.040
										SUB TOTAL =	**2497.877**

Station **44 + 298.920** **skew** **60 °** **INLET**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		13.420	5.962

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	16.221	as	14	16.221	0.00	16.221	2 x 1 = 2	32.441	1.21	39.254
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	90 x 1 = 90	142.931	1.21	172.947
	A100	5.847	as	12	5.847	0	5.847	6 x 5 = 30	175.396	0.888	155.752
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	30 x 2 = 60	116.052	1.21	140.422
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	30 x 3 = 90	155.555	1.21	188.221
	F300 G300	5.847	0.15	12	5.847	0	5.847	80 x 2 = 160	935.445	0.888	830.675
	L3 F301	ave = 5.450 x=0.15 max =10.127 min = 0.773	0.2	12	5.600	0	5.600	28 x 2 = 56	313.601	0.888	278.478
	L3 G301	ave = 5.450 x=0.15 max =10.127 min = 0.773	0.2	12	5.600	0	5.600	28 x 2 = 56	313.601	0.888	278.478
	L4 F301	10.127	0.2	12	10.127	0	10.127	9 x 1 = 9	91.139	0.888	80.931
	L4 G301	10.127	0.2	12	10.127	0	10.127	9 x 1 = 9	91.139	0.888	80.931
									TOTAL FOR INLET APRON		**2246.089**

Station **44 + 298.920** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	-2.29060°		13.420	5.962

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.420	as	12	6.420	0	6.420	2 x 5 = 10	64.203	0.888	57.012
	B101-18Ø	0.15 ave =2.478 0.38 max =2.903 min =2.052	0.15	18	3.008	0	3.008	13 x 2 = 26	78.20	2.000	156.393
	B101-14Ø	0.15 ave =1.072 0.38 max =1.987 min =0.158	0.15	14	1.602	0	1.602	27 x 2 = 54	86.53	1.210	104.707
	C101	0.15 ave =1.531 0.24 max =2.903 min =0.158	0.15	12	1.921	0	1.921	40 x 2 = 80	153.65	0.888	136.445
	D101-16Ø	0.15 ave =2.478 0.32 max =2.903 min =2.052	0.15	16	2.948	0	2.948	13 x 6 = 78	229.91	1.580	363.257
	D101-14Ø	0.15 ave =1.072 0.32 max =1.987 min =0.158	0.15	14	1.542	0	1.542	27 x 6 = 162	249.80	1.210	302.263
	A101	ave =2.977 max =5.560 min =0.395	0.15	12	2.977	0	2.977	17 x 10 = 170	506.143	0.888	449.455
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR INLET WING WALL		**1791.724**

Station **44 + 298.920** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.413°			13.420	5.962

TOE WALL (INLET)	A205	16.221	as	14	16.221	0	16.221	10 x 1 = 10	162.206	1.21	196.269
	A203	0.173 0.774 0.800 0.196	0.15	14	2.743	0	2.743	104 x 1 = 104	285.288	1.21	345.198
									TOTAL FOR INLET TOE WALL		**541.467**

Station 44 + 298.920 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP	BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°	13.420	7.175

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	16.221	as	14	16.221	0.00	16.221	2 x 1 = 2	32.441	1.21	39.254
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	90 x 1 = 90	142.931	1.21	172.947
	A100	7.060	as	12	7.060	0	7.060	6 x 5 = 30	211.786	0.888	188.066
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	36 x 2 = 72	139.262	1.21	168.507
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	36 x 3 = 108	186.666	1.21	225.865
	F300 G300	7.060	0.15	12	7.060	0	7.060	80 x 2 = 160	1129.525	0.888	1003.018
	L3 F301	ave = 6.512 x=0.15 max =12.228 min = 0.796	0.2	12	6.662	0	6.662	34 x 2 = 68	453.001	0.888	402.265
	L3 G301	ave = 6.512 x=0.15 max =12.228 min = 0.796	0.2	12	6.662	0	6.662	34 x 2 = 68	453.001	0.888	402.265
	L4 F301	12.948	0.2	12	12.948	0	12.948	3 x 1 = 3	38.843	0.888	34.492
	L4 G301	12.948	0.2	12	12.948	0	12.948	3 x 1 = 3	38.843	0.888	34.492
									TOTAL FOR OUTLET APRON		**2671.171**

Station **44 + 298.920** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		13.420	7.175

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.533	as	12	7.533	0	7.533	2 x 5 = 10	75.328	0.888	66.891
	B101-18Ø	0.15 ave = 2.550 0.38 max = 2.903 min = 2.196	0.15	18	3.080	0	3.080	13 x 2 = 26	80.07	2.000	160.137
	B101-14Ø	0.15 ave = 1.141 0.38 max = 2.131 min = 0.151	0.15	14	1.671	0	1.671	35 x 2 = 70	116.96	1.210	141.524
	C101	0.15 ave = 1.527 0.24 max = 2.903 min = 0.151	0.15	12	1.917	0	1.917	48 x 2 = 96	184.04	0.888	163.427
	D101-16Ø	0.15 ave = 2.550 0.32 max = 2.903 min = 2.196	0.15	16	3.020	0	3.020	13 x 6 = 78	235.53	1.580	372.130
	D101-14Ø	0.15 ave = 1.141 0.32 max = 2.131 min = 0.151	0.15	14	1.611	0	1.611	35 x 6 = 210	338.31	1.210	409.355
	A101	ave = 3.551 max = 6.707 min = 0.395	0.15	12	3.551	0	3.551	17 x 10 = 170	603.678	0.888	536.066
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR OUTLET WING WALL		**2071.723**

Station **44 + 298.920** **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.413°			13.420	7.175
TOE WALL (OUTLET)	A205	16.221	as	14	16.221	0	16.221	20 x 1 = 20	324.412	1.21	392.538
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	104 x 1 = 104	493.288	1.21	596.878
									TOTAL FOR OUTLET TOE WALL		**989.417**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 44 + 298.920 **skew** 60° **Left**

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.231	0.85	39.679	13.420	15.496

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
BO3	10	165.810	165.810
05	12	14,974.020	22,371.954
11		1,587.780	
B02		268.105	
Y12		183.369	
W.W.		5,358.681	
03	14	2,883.854	12,165.212
04		2,268.188	
06		3,377.021	
W.W.		3,636.150	
09	16	9,587.946	11,415.894
H300		394.076	
E.J.		568.800	
W.W.		865.073	
W.W.	18	316.530	316.530
01	20	10,232.567	38,470.017
02		5,933.211	
07		8,935.762	
08		8,563.142	
10		4,670.177	
W.W.		135.158	
B04	22	242.493	242.493
	24	0.000	0.000
B01	25	675.225	675.225
		TOTAL WEIGHT =	**85,823.136**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 44 + 298.920 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.231	0.85	39.679	13.420	15.496

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	170.397
BOTTOM SLAB	Vol. = Length * X * T1	191.697
OUTER WALLS	Vol. = Length * H * 2W1	63.486
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	77.374
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.310
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	1.395
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.397
	TOTAL VOLUME =	**505.056**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 44 + 298.920 skew 60° Left

NON-STANDARD

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNES S (T)	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	5.962	7.175	0.250	13.420	15.496

X2	SLOPE
0.29	2.309 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	20.003
APRON OUTLET	Vol. = Lo * X * T	24.072
TOE WALL INLET	Vol. = XS * T * (1-T)	2.906
TOE WALL OUTLET	Vol. = XS * T * (2-T)	6.780
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	4.204
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	5.038
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	6.557
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	7.891
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.593
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.731
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.874
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	1.078
END KEY BLOCKS OUTER (INLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.643
END KEY BLOCKS OUTER (OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)	1.643
	TOTAL VOLUME =	**84.013**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																					
	B	D	TOW	TIW	TBS	TTS	01		02		03		04		05		06		07		08		09		10		11	
							SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG
1	1000	1000	200	200	240	200	16	150	20	150	14	150	12	150	12	200	16	200										
2							16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150				
3							16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150
4							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
1	1500	1000	220	200	260	220	20	150	25	150	14	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	1500	1500	220	220	260	220	16	150	25	150	14	150	12	150	12	200	16	200										
2							16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150
1	2000	1000	240	200	280	240	20	150	25	150	14	150	12	150	12	200	16	200										
2							20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
4							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
5							20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
1	2000	1500	240	220	280	240	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150				
3							20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
4							20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150
5							25	150	25	150	14	150	14	150	12	200	16	200	25	150	20	150	20	150	20	150	12	150
1	2000	2000	240	240	280	240	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	16	150	16	150	12	200	16	200	25	150	16	150	16	150				
3							20	150	25	150	16	150	16	150	12	200	16	200	25	150	20	150	16	150	25	150	12	150
4							20	150	25	150	14	150	16	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150
5							25	150	25	150	14	150	16	150	12	200	16	200	25	150	20	150	20	150	20	150	12	150
1	2500	1000	280	200	320	280	20	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	2500	1500	280	220	320	280	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	2500	2000	280	240	320	280	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	16	150	14	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
5							20	150	20	150	16	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	2500	2500	280	260	320	280	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150				
3							20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150
4							20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	16	150	20	150	12	150
5							20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.																												
NO. OF VENTS	CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT																											
	DIMENSIONS (mm)						REINFORCEMENT																					
	B	D	TOW	TIW	TBS	TTS	01		02		03		04		05		06		07		08		09		10		11	
							SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG
1	3000	1000	320	200	360	320	20	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	3000	1500	320	220	360	320	16	150	20	150	14	150	12	150	12	200	14	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150
1	3000	2000	320	240	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							16	150	20	150	16	150	12	150	12	200	14	200	25	150	16	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3000	2500	320	260	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
5							20	150	20	150	14	150	14	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3000	3000	320	280	360	320	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
4							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
5							25	150	20	150	16	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	12	150
1	3500	1000	360	200	400	360	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3500	1500	360	220	400	360	20	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150
4							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
5							20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150
1	3500	2000	360	240	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
4							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
5							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
1	3500	2500	360	260	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
4							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
5							20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150
1	3500	3000	360	280	400	360	16	150	25	150	16	150	12	150	12	200	16	200										
2							20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150				
3							20	150	20	150	20	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150
4							20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150
5							20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)							REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
1	1000	1000	200	200	240	200	750	16	150	20	150	14	150	12	150	12	200	16	200											14 Y16	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150					14 Y16	Y12@200	2 Y10@200	6 Y14
3								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150	14 Y16	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y16	Y12@200	2 Y10@200	6 Y14
1	1500	1000	220	200	260	220	850	20	150	25	150	14	150	12	150	12	200	16	200											14 Y18	Y12@200	2 Y10@200	6 Y14
2								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150					14 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
1	1500	1500	220	220	260	220	850	16	150	25	150	14	150	12	150	12	200	16	200											14 Y18	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					14 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	14 Y18	Y12@200	2 Y10@200	6 Y14
1	2000	1000	240	200	280	240	950	20	150	25	150	14	150	12	150	12	200	16	200											14 Y20	Y12@200	2 Y10@200	6 Y16
2								20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					14 Y20	Y12@200	2 Y10@200	6 Y16
3								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y14
1	2000	1500	240	220	280	240	950	16	150	25	150	16	150	12	150	12	200	16	200											14 Y20	Y12@200	2 Y10@200	6 Y16
2								20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150					14 Y20	Y12@200	2 Y10@200	6 Y16
3								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y16
4								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	14 Y20	Y12@200	2 Y10@200	6 Y16
1	2500	1000	280	200	320	280	950	20	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y16
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y16
1	2500	1500	280	220	320	280	950	20	150	25	150	16	150	12	150	12	200	16	200											14 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1000	320	200	360	320	950	20	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150					14 Y22	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
1	3000	1500	320	220	360	320	950	16	150	20	150	14	150	12	150	12	200	14	200											14 Y22	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					14 Y22	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	14 Y22	Y12@200	2 Y10@200	6 Y20
1	3500	1000	360	200	400	360	950	20	150	25	150	16	150	12	150	12	200	16	200											14 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150					14 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	14 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	3000	360	280	400	360	950	16	150	25	150	16	150	12	150	12	200	16	200											14 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150					14 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	20	150	12	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150	14 Y25	Y12@200	2 Y10@200	6 Y25
4								20	150	20	150	20	150	14	150	12	200	14	200	25	150	20	150	16	150	20	150	14	150	14 Y25	Y12@200	2 Y10@200	6 Y25

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
1	1000	1000	200	200	240	200	500	16	150	20	150	14	150	12	150	12	200	16	200											10 Y16	Y12@200	2 Y10@200	6 Y12
2								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150					10 Y16	Y12@200	2 Y10@200	6 Y12
3								16	150	20	150	14	150	12	150	12	200	16	200	16	150	16	150	16	150	20	150	12	150	10 Y16	Y12@200	2 Y10@200	6 Y12
4								20	150	20	150	14	150	16	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y16	Y12@200	2 Y10@200	6 Y12
1	1500	1000	220	200	260	220	600	20	150	25	150	14	150	12	150	12	200	16	200											10 Y18	Y12@200	2 Y10@200	6 Y14
2								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150					10 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
1	1500	1500	220	220	260	220	600	16	150	25	150	14	150	12	150	12	200	16	200											10 Y18	Y12@200	2 Y10@200	6 Y14
2								16	150	20	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					10 Y18	Y12@200	2 Y10@200	6 Y14
3								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
4								20	150	20	150	14	150	14	150	12	200	16	200	20	150	16	150	20	150	20	150	12	150	10 Y18	Y12@200	2 Y10@200	6 Y14
1	2000	1000	240	200	280	240	850	20	150	25	150	14	150	12	150	12	200	16	200											10 Y20	Y12@200	2 Y10@200	6 Y14
2								20	150	25	150	14	150	12	150	12	200	16	200	20	150	16	150	16	150					10 Y20	Y12@200	2 Y10@200	6 Y14
3								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	12	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
1	2000	1500	240	220	280	240	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y20	Y12@200	2 Y10@200	6 Y14
2								20	150	25	150	14	150	14	150	12	200	16	200	20	150	16	150	16	150					10 Y20	Y12@200	2 Y10@200	6 Y14
3								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
4								20	150	25	150	14	150	14	150	12	200	16	200	20	150	20	150	20	150	20	150	12	150	10 Y20	Y12@200	2 Y10@200	6 Y14
1	2500	1000	280	200	320	280	850	20	150	20	150	14	150	12	150	12	200	14	200											10 Y22	Y12@200	2 Y10@200	6 Y16
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y16
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y16
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y16
1	2500	1500	280	220	320	280	850	20	150	25	150	16	150	12	150	12	200	16	200											10 Y22	Y12@200	2 Y10@200	6 Y18
2								20	150	20	150	14	150	12	150	12	200	14	200	22	150	16	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	2500	1500	280	220	320	280	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y22	Y12@200	2 Y10@200	6 Y20
2								20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150					10 Y22	Y12@200	2 Y10@200	6 Y18
3								20	150	25	150	16	150	12	150	12	200	16	200	25	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	25	150	16	150	16	150	12	200	16	200	20	150	20	150	16	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1000	320	200	360	320	850	20	150	20	150	14	150	12	150	12	200	14	200											10 Y22	Y12@200	2 Y10@200	6 Y20
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	20	150					10 Y22	Y12@200	2 Y10@200	6 Y20
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y22	Y12@200	2 Y10@200	6 Y18
1	3000	1500	320	220	360	320	850	16	150	20	150	14	150	12	150	12	200	14	200											10 Y25	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y20
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	16	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y20
1	3000	2000	320	220	360	320	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y25
2								16	150	20	150	16	150	12	150	12	200	14	200	25	150	16	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	1000	360	200	400	360	850	20	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y22
2								20	150	20	150	14	150	12	150	12	200	14	200	25	150	20	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y22
3								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	14	150	12	150	12	200	14	200	20	150	20	150	20	150	20	150	12	150	10 Y25	Y12@200	2 Y10@200	6 Y22
1	3500	3000	360	280	400	360	850	16	150	25	150	16	150	12	150	12	200	16	200											10 Y25	Y12@200	2 Y10@200	6 Y25
2								20	150	20	150	16	150	12	150	12	200	14	200	25	150	20	150	16	150					10 Y25	Y12@200	2 Y10@200	6 Y25
3								20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150	10 Y25	Y12@200	2 Y10@200	6 Y22
4								20	150	20	150	16	150	12	150	12	200	14	200	20	150	20	150	16	150	20	150	14	150	10 Y25	Y12@200	2 Y10@200	6 Y20

REINFORCED BOX CULVERTS - FILL COVER FROM 0.25m. TO 1.00m.

CROSS-SECTIONAL DIMENSIONS & REINFORCEMENT

NO. OF VENTS	DIMENSIONS (mm)						REINFORCEMENT																									
	B	D	TOW	TIW	TBS	TTS	BB	01		02		03		04		05		06		07		08		09		10		11		B01	B02	B03	B04
								SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG	SIZE	SPCG				
2	4000	4000	380	250	480	400	900	20	150	16	150	16	150	14	150	10	150	10	150	22	150	16	150	10	150					12 Y25	Y12@200	2 Y10@200	8 Y22
1	4500	2000	400	250	520	400	900																										
2								16	150	20	150	16	150	12	150	12	150	12	150	22	150	16	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	2500	400	250	520	400	900																										
2								16	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	16	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	3000	400	250	520	400	900																										
2								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	18	150	12	150	12	150	12	150	20	150	16	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								18	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	14	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	3500	400	250	520	400	900																										
2								18	150	20	150	18	150	12	150	12	150	12	150	22	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								18	150	20	150	18	150	12	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								20	150	20	150	16	150	12	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	4000	400	250	520	400	900																										
2								20	150	20	150	18	150	14	150	12	150	12	150	25	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								20	150	22	150	18	150	14	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								20	150	22	150	18	150	14	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	
1	4500	45000	400	250	520	400	900																										
2								22	150	20	150	18	150	16	150	12	150	12	150	25	150	18	150	12	150					12 Y25	Y12@200	Y10@200	8 Y22
3								22	150	22	150	18	150	16	150	12	150	12	150	22	150	18	150	12	150	20	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
4								22	150	22	150	18	150	16	150	12	150	12	150	22	150	18	150	12	150	18	150	14	150	12 Y25	Y12@200	Y10@200	8 Y22
5																																	

NOTES:

1. DESIGN WAS MADE ACCORDING TO M.O.C. MANUAL.
2. CONCRETE SPECIFIED CYLINDER STRENGTH 270 KGS/CM² AFTER 28 DAYS.
3. REINFORCEMENT STEEL YIELD STRENGTH 4200 KG/CM²
4. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE MENTIONED
5. CONCRETE COVER:
   - TOP SLAB
     - TOP REINFORCEMENT = 50mm
     - BOTTOM REINF. = 30mm.
   - BOTTOM SLAB & EXTERNAL WALLS
     - EXTERNAL REINF. = 50mm.
     - INTERNAL REINF. = 30mm.
   - INTERNAL WALLS REINF. = 30mm.
6. FOR R.C. BOX CULVERTS WITH 11 VENTS USE TWO SECTIONS 4 VENTS R.C. BOX CULVERTS PLUS ONE SECTION 3 VENTS R.C. BOX CULVERT WITH INTERMEDIATE EXPANSION JOINTS
7. FOR R.C. BOX CULVERTS WITH 15 & 20 VENTS USE 3 & 4 SECTIONS 5 VENTS R.C. BOX CULVERTS RESPECTIVELY WITH INTERMEDIATE EXPANSION JOINTS

TWO CELLS R.C. BOX CULVERT

ONE CELL R.C. BOX CULVERT

THREE CELLS R.C. BOX CULVERT

FOUR CELLS R.C. BOX CULVERT

FIVE CELLS R.C. BOX CULVERT

BOX CULVERT ENDut cursor here f

ONE CELL R.C. BOX CULVERT

FOUR CELLS R.C. BOX CULVERT

TWO CELLS R.C. BOX CULVERT

THREE CELLS R.C. BOX CULVERT

ut cursor here f

BOX CULVERT
END DETAIL PLANS
45º SKEW & 60º SKEW

WALL & BARREL ELEVATION

PART LONGITUDINAL SECTION

EDGE CURB WIDTH	
EMBANKMENT SLOPE	WIDTH (WC)
6 : 1	0.60
4 : 1	0.40
3 : 1	0.30
2 : 1	0.20

PART SEC. A – A

DETAIL " A "

RCBC 4 - CELLS

CROSS - SECTIONAL DIMENSIONS & REINFORCEMENT

RCBC CELL DIMENSIONS						REINFORCEMENT																									
SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT END SECTION OF CULVERT						**TABLE 1 - 1.50m. FILL COVER OR LESS**																									
1.00	1.00	0.24	0.20	0.20	0.20	14	0.44	0.97	14	0.44	1.96	14	0.44	2.10	20	0.26	1.36	20	0.26	2.60	14	0.44	1.82	14	0.44	1.57	27	39	7	3	89
1.50	1.00	0.26	0.22	0.22	0.20	14	0.30	1.19	14	0.40	2.66	14	0.40	2.95	20	0.22	1.88	20	0.22	3.60	14	0.40	1.86	14	0.44	1.61	35	47	7	3	105
	1.50				0.22		0.30	1.34		0.40	2.68		0.40	2.99		0.20	1.90		0.22	3.66		0.40	2.36		0.44	2.11			9	4	112
2.00	1.00	0.28	0.24	0.24	0.20	14	0.18	1.40	14	0.36	3.35	14	0.36	3.80	20	0.20	2.40	20	0.18	4.60	14	0.36	1.90	14	0.44	1.65	43	63	7	3	129
	1.50				0.22		0.18	1.55		0.36	3.37		0.36	3.84		0.18	2.42		0.18	4.66		0.36	2.40		0.44	2.15			9	4	136
	2.00				0.24		0.18	1.70		0.36	3.39		0.36	3.88		0.18	2.44		0.18	4.72		0.36	2.90		0.44	2.65			11	5	143
2.50	1.00	0.32	0.28	0.28	0.20	16	0.30	1.66	14	0.30	4.07	14	0.30	4.65	24	0.28	2.94	24	0.28	5.60	14	0.30	1.98	14	0.44	1.73	51	67	7	3	141
	1.50				0.22		0.30	1.81		0.30	4.09		0.30	4.69		0.28	2.96		0.28	5.66		0.30	2.48		0.44	2.23			9	4	148
	2.00				0.24		0.30	1.96		0.30	4.11		0.30	4.73		0.28	2.98		0.28	5.72		0.30	2.98		0.44	2.73			11	5	155
	2.50				0.26		0.30	2.11		0.30	4.13		0.30	4.77		0.26	3.00		0.28	5.78		0.30	3.48		0.44	3.23			13	6	162
3.00	1.00	0.36	0.32	0.32	0.20	16	0.36	1.91	14	0.24	4.78	14	0.24	5.50	24	0.30	3.48	24	0.28	6.60	14	0.24	2.06	14	0.44	1.81	59	71	7	3	153
	1.50				0.22		0.36	2.06		0.24	4.80		0.24	5.54		0.28	3.50		0.28	6.66		0.24	2.56		0.44	2.31			9	4	160
	2.00				0.24		0.36	2.21		0.24	4.82		0.24	5.58		0.28	3.52		0.28	6.72		0.24	3.06		0.44	2.81			11	5	167
	2.50				0.26		0.36	2.36		0.24	4.84		0.24	5.62		0.28	3.54		0.28	6.78		0.24	3.56		0.44	3.31			13	6	174
	3.00				0.28		0.36	2.51		0.24	4.86		0.24	5.66		0.26	3.56		0.28	6.84		0.24	4.06		0.44	3.81			15	7	181
3.50	1.00	0.40	0.36	0.36	0.20	16	0.36	2.17	16	0.24	5.55	14	0.24	6.35	24	0.30	4.02	24	0.28	7.60	14	0.24	2.14	14	0.44	1.89	67	79	7	3	169
	1.50				0.22		0.36	2.32		0.24	5.57		0.24	6.39		0.30	4.04		0.28	7.66		0.24	2.64		0.44	2.39			9	4	176
	2.00				0.24		0.36	2.47		0.24	5.59		0.24	6.43		0.28	4.06		0.28	7.72		0.24	3.14		0.44	2.89			11	5	183
	2.50				0.26		0.36	2.62		0.24	5.61		0.24	6.47		0.28	4.08		0.28	7.78		0.24	3.64		0.44	3.39			13	6	190
	3.00				0.28		0.36	2.77		0.24	5.63		0.24	6.51		0.28	4.10		0.28	7.84		0.24	4.14		0.44	3.89			15	7	197

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT END SECTION OF CULVERT						**TABLE 2 - FILL COVER OVER 1.50m. TO 5.0m.**																									
1.00	1.00	0.24	0.20	0.20	0.20	14	0.44	0.97	14	0.44	1.96	14	0.44	2.10	14	0.44	1.36	14	0.44	2.60	14	0.44	1.82	14	0.44	1.57	27	27	7	3	77
1.50	1.00	0.26	0.22	0.22	0.20	14	0.40	1.19	14	0.40	2.66	14	0.40	2.95	14	0.36	1.88	14	0.44	3.60	14	0.40	1.86	14	0.44	1.61	35	35	7	3	93
	1.50				0.22		0.40	1.34		0.40	2.68		0.40	2.99		0.36	1.90		0.44	3.66		0.40	2.36		0.44	2.11			9	4	100
2.00	1.00	0.28	0.24	0.24	0.20	14	0.40	1.40	16	0.40	3.40	14	0.30	3.80	14	0.28	2.40	14	0.34	4.60	14	0.40	1.90	14	0.44	1.65	43	43	7	3	109
	1.50				0.22		0.40	1.55		0.40	3.42		0.30	3.84		0.26	2.42		0.34	4.66		0.40	2.40		0.44	2.15			9	4	116
	2.00				0.24		0.40	1.70		0.40	3.44		0.30	3.88		0.26	2.44		0.34	4.72		0.40	2.90		0.44	2.65			11	5	123
2.50	1.00	0.32	0.28	0.28	0.20	14	0.36	1.66	16	0.36	4.12	14	0.24	4.65	14	0.22	2.94	14	0.28	5.60	14	0.36	1.98	14	0.44	1.73	51	51	7	3	125
	1.50				0.22		0.36	1.81		0.36	4.14		0.24	4.69		0.20	2.96		0.28	5.66		0.36	2.48		0.44	2.23			9	4	132
	2.00				0.24		0.36	1.96		0.36	4.16		0.24	4.73		0.20	2.98		0.28	5.72		0.36	2.98		0.44	2.73			11	5	139
	2.50				0.26		0.36	2.11		0.36	4.18		0.24	4.77		0.20	3.00		0.28	5.78		0.36	3.48		0.44	3.23			13	6	146
3.00	1.00	0.36	0.32	0.32	0.20	14	0.24	1.91	16	0.36	4.83	14	0.18	5.50	14	0.18	3.48	14	0.24	6.60	14	0.36	2.06	14	0.44	1.81	59	59	7	3	141
	1.50				0.22		0.24	2.06		0.36	4.85		0.18	5.54		0.18	3.50		0.24	6.66		0.36	2.56		0.44	2.31			9	4	148
	2.00				0.24		0.24	2.21		0.36	4.87		0.18	5.58		0.16	3.52		0.24	6.72		0.36	3.06		0.44	2.81			11	5	155
	2.50				0.26		0.24	2.36		0.36	4.89		0.18	5.62		0.16	3.54		0.24	6.78		0.36	3.56		0.44	3.31			13	6	162
	3.00				0.28		0.24	2.51		0.36	4.91		0.18	5.66		0.16	3.56		0.24	6.84		0.36	4.06		0.44	3.81			15	7	169
3.50	1.00	0.40	0.36	0.36	0.20	14	0.28	2.17	20	0.28	5.60	16	0.28	6.35	14	0.16	4.02	14	0.20	7.60	14	0.28	2.14	14	0.44	1.89	67	67	7	3	157
	1.50				0.22		0.28	2.32		0.28	5.62		0.28	6.39		0.14	4.04		0.20	7.66		0.28	2.64		0.44	2.39			9	4	164
	2.00				0.24		0.28	2.47		0.28	5.64		0.28	6.43		0.14	4.06		0.20	7.72		0.28	3.14		0.44	2.89			11	5	171
	2.50				0.26		0.28	2.62		0.28	5.66		0.28	6.47		0.14	4.08		0.20	7.78		0.28	3.64		0.44	3.39			13	6	178
	3.00				0.28		0.28	2.77		0.28	5.68		0.28	6.51		0.14	4.10		0.20	7.84		0.28	4.14		0.44	3.89			15	7	185

RCBC 4 CELLS

RCBC 4 CELLS

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT FIRST INTERMEDIATE SECTION						**TABLE 3 - FILL COVER OVER 5.0m. TO 10.0m.**																									
1.00	1.00	0.28	0.24	0.24	0.24	14	0.44	1.05	14	0.44	2.00	14	0.44	2.10	14	0.42	1.40	14	0.44	2.60	14	0.44	1.90	14	0.44	1.65	27	27	7	3	77
1.50	1.00	0.30	0.26	0.26	0.24	14	0.40	1.27	16	0.40	2.75	14	0.30	2.95	14	0.26	1.92	14	0.36	3.60	14	0.40	1.94	14	0.44	1.69	35	35	7	3	93
	1.50				0.26		0.40	1.42		0.40	2.77		0.30	2.99		0.26	1.94		0.36	3.66		0.40	2.44		0.44	2.19			9	4	100
2.00	1.00	0.32	0.28	0.28	0.24	14	0.32	1.48	20	0.32	3.49	16	0.32	3.80	16	0.24	2.44	14	0.26	4.60	14	0.32	1.98	14	0.44	1.73	43	43	7	3	109
	1.50				0.26		0.32	1.63		0.32	3.51		0.32	3.84		0.22	2.46		0.26	4.66		0.32	2.48		0.44	2.23			9	4	116
	2.00				0.28		0.32	1.78		0.32	3.53		0.32	3.88		0.22	2.48		0.26	4.72		0.32	2.98		0.44	2.73			11	5	123
2.50	1.00	0.36	0.32	0.32	0.24	14	0.32	1.74	20	0.32	4.21	16	0.32	4.65	16	0.18	2.98	14	0.20	5.60	14	0.32	2.06	14	0.44	1.81	51	51	7	3	125
	1.50				0.26		0.32	1.89		0.32	4.23		0.32	4.69		0.18	3.00		0.20	5.66		0.32	2.56		0.44	2.31			9	4	132
	2.00				0.28		0.32	2.04		0.32	4.25		0.32	4.73		0.16	3.02		0.20	5.72		0.32	3.06		0.44	2.81			11	5	139
	2.50				0.30		0.32	2.19		0.32	4.27		0.32	4.77		0.16	3.04		0.20	5.78		0.32	3.56		0.42	3.31			13	6	146
3.00	1.00	0.42	0.38	0.38	0.24	14	0.24	2.03	20	0.24	4.94	16	0.24	5.50	20	0.24	3.54	16	0.22	6.60	14	0.24	2.18	14	0.44	1.93	59	59	7	3	141
	1.50				0.26		0.24	2.18		0.24	4.96		0.24	5.54		0.24	3.56		0.22	6.66		0.24	2.68		0.44	2.43			9	4	148
	2.00				0.28		0.24	2.33		0.24	4.98		0.24	5.58		0.24	3.58		0.22	6.72		0.24	3.18		0.44	2.93			11	5	155
	2.50				0.30		0.24	2.48		0.24	5.00		0.24	5.62		0.22	3.60		0.22	6.78		0.24	3.68		0.42	3.43			13	6	162
	3.00				0.32		0.24	2.63		0.24	5.02		0.24	5.66		0.22	3.62		0.22	6.84		0.24	4.18		0.40	3.93			15	7	169
3.50	1.00	0.48	0.44	0.44	0.24	16	0.36	2.33	20	0.24	5.68	20	0.24	6.35	20	0.22	4.10	16	0.18	7.60	14	0.24	2.30	14	0.44	2.05	67	67	7	3	157
	1.50				0.26		0.36	2.48		0.24	5.70		0.24	6.39		0.22	4.12		0.18	7.66		0.24	2.80		0.44	2.55			9	4	164
	2.00				0.28		0.36	2.63		0.24	5.72		0.24	6.43		0.20	4.14		0.18	7.72		0.24	3.30		0.44	3.05			11	5	171
	2.50				0.30		0.36	2.78		0.24	5.74		0.24	6.47		0.20	4.16		0.18	7.78		0.24	3.80		0.42	3.55			13	6	178
	3.00				0.32		0.36	2.93		0.24	5.76		0.24	6.51		0.20	4.18		0.18	7.84		0.24	4.30		0.40	4.05			15	7	185

RCBC 4 - CELLS

SPAN	HEIGHT	SLAB		WALL		SIZE, SPACING & LENGTH OF TRANSVERSE REINFORCEMENT																					NO. OF 14Ø LONGIT. BARS				
		BOT.	TOP	EXT.	INT.	BAR A			BAR B			BAR C			BAR D			BAR E			BAR F			BAR G			SLAB		EACH WALL		
S	H	T1	T2	W1	W2	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG.	LGTH	SIZE	SPCG	LGTH	SIZE	SPCG.	LGTH	BOT.	TOP	EXT.	INT.	TOTAL
AT SECOND INTERMEDIATE SECTION						**TABLE 4 - FILL COVER OVER 10.0m. TO 15.0m.**																									
1.00	1.00	0.32	0.28	0.28	0.28	14	0.44	1.13	14	0.44	2.04	14	0.44	2.10	14	0.34	1.44	14	0.44	2.60	14	0.44	1.98	14	0.44	1.73	27	27	7	3	77
1.50	1.00	0.34	0.30	0.30	0.28	14	0.24	1.35	16	0.36	2.79	14	0.24	2.95	14	0.20	1.96	14	0.28	3.60	14	0.36	2.02	14	0.44	1.77	35	35	7	3	93
	1.50				0.30		0.24	1.50		0.36	2.81		0.24	2.99		0.20	1.98		0.28	3.66		0.36	2.52		0.42	2.27			9	4	100
2.00	1.00	0.42	0.38	0.38	0.28	14	0.36	1.68	16	0.24	3.54	16	0.24	3.80	14	0.16	2.54	14	0.24	4.60	14	0.24	2.18	14	0.44	1.93	43	43	7	3	109
	1.50				0.30		0.36	1.83		0.24	3.56		0.24	3.84		0.16	2.56		0.24	4.66		0.24	2.68		0.42	2.43			9	4	116
	2.00				0.32		0.36	1.98		0.24	3.58		0.24	3.88		0.16	2.58		0.24	4.72		0.24	3.18		0.40	2.93			11	5	123
2.50	1.00	0.50	0.46	0.46	0.28	14	0.42	2.02	20	0.28	4.35	20	0.28	4.65	16	0.18	3.12	14	0.18	5.60	14	0.28	2.34	14	0.44	2.09	51	51	7	3	125
	1.50				0.30		0.42	2.17		0.28	4.37		0.28	4.69		0.16	3.14		0.18	5.66		0.28	2.84		0.42	2.59			9	4	132
	2.00				0.32		0.42	2.32		0.28	4.39		0.28	4.73		0.16	3.16		0.18	5.72		0.28	3.34		0.40	3.09			11	5	139
	2.50				0.34		0.42	2.47		0.28	4.41		0.28	4.77		0.16	3.18		0.18	5.78		0.28	3.84		0.36	3.59			13	6	146
3.00	1.00	0.58	0.54	0.54	0.28	16	0.30	2.35	24	0.30	5.20	20	0.30	5.50	20	0.24	3.70	14	0.16	6.60	14	0.30	2.50	14	0.44	2.25	59	59	7	3	141
	1.50				0.30		0.30	2.50		0.30	5.22		0.30	5.54		0.22	3.72		0.16	6.66		0.30	3.00		0.42	2.75			9	4	148
	2.00				0.32		0.30	2.65		0.30	5.24		0.30	5.58		0.22	3.74		0.16	6.72		0.30	3.50		0.40	3.25			11	5	155
	2.50				0.34		0.30	2.80		0.30	5.26		0.30	5.62		0.22	3.76		0.16	6.78		0.30	4.00		0.36	3.75			13	6	162
	3.00				0.36		0.30	2.95		0.30	5.28		0.30	5.66		0.22	3.78		0.16	6.84		0.30	4.50		0.34	4.25			15	7	169
3.50	1.00	0.68	0.64	0.64	0.28	16	0.28	2.73	24	0.28	5.93	20	0.28	6.35	20	0.22	4.30	14	0.14	7.60	14	0.28	2.70	14	0.44	2.45	67	67	7	3	157
	1.50				0.30		0.28	2.88		0.28	5.95		0.28	6.39		0.20	4.32		0.14	7.66		0.28	3.20		0.42	2.95			9	4	164
	2.00				0.32		0.28	3.03		0.28	5.97		0.28	6.43		0.20	4.34		0.14	7.72		0.28	3.70		0.40	3.45			11	5	171
	2.50				0.34		0.28	3.18		0.28	5.99		0.28	6.47		0.20	4.36		0.14	7.78		0.28	4.20		0.36	3.95			13	6	178
	3.00				0.36		0.28	3.33		0.28	6.01		0.28	6.51		0.18	4.38		0.14	7.84		0.28	4.70		0.34	4.45			15	7	185

RCBC 4 - CELLS

QUANTITIES PER METER OF CULVERT								
RCBC		FOR TABLE 1 & 2			TABLE 3		TABLE 4	
S	H	C C.M.	STEEL KGS. TAB 1	STEEL KGS. TAB 2	C C.M.	STL KGS.	C C.M.	STL KGS.
1.00	1.00	3.200	291	209	3.842	213	4.495	221
1.50	1.00	4.419	413	273	5.227	314	6.048	365
	1.50	5.058	445	295	5.971	336	6.895	390
2.00	1.00	5.802	570	372	6.776	483	9.088	520
	1.50	6.463	610	397	7.542	513	10.024	546
	2.00	7.184	636	419	8.368	537	11.004	574
2.50	1.00	7.856	677	490	9.003	612	12.815	726
	1.50	8.562	703	519	9.814	636	13.317	766
	2.00	9.328	729	542	10.685	674	14.934	794
	2.50	10.154	767	565	11.616	700	16.022	826
3.00	1.00	10.243	804	641	12.168	843	17.242	951
	1.50	10.994	842	665	13.046	876	18.350	993
	2.00	11.805	869	701	13.984	903	19.535	1022
	2.50	12.676	895	725	14.982	945	22.773	1056
	3.00	13.606	936	750	16.040	976	22.979	1088
3.50	1.00	12.963	947	826	15.842	1095	23.083	1158
	1.50	13.759	974	869	16.787	1122	24.311	1207
	2.00	14.614	1015	894	17.792	1169	25.600	1237
	2.50	15.530	1042	920	18.857	1198	26.943	1272
	3.00	16.506	1069	945	19.982	1229	28.358	1329

CUTTING & BENDING DIAGRAMS

BAR SIZE	MIN. X
14Ø	0.25
16Ø	0.30
20Ø	0.35
24Ø	0.40
32Ø	0.60

NOTES FOR REINFORCEMENT BARS

1.) FABRICATION & TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE
2.) ALL DIMENSIONS ARE OUT TO OUT BARS
3.) NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR UNLESS OTHERWISE NOTED
4.) WEIGHT MEASUREMENT FOR ESTIMATING PURPOSES IS MADE TO THE NEAREST KILOGRAM PER METER OF CULVERT.

NOTE:

CONSTRUCTION JOINTS PERPENDICULAR TO THE LONGITUDINAL AXIS OF THE CULVERT SHALL BE PROVIDED TO A MAXIMUM OF 30m. INTERVALS

NEW LOADING - 3 AXLE 600KN TRUCK

NOTE:

ALL TRANSVERSE & OTHER LONGI. REINF. ARE THE SAME AS THOSE SHOWN IN TYPICAL NORMAL SECTION

CONSTRUCTION JOINT DETAIL

TYPICAL NORMAL SECTION OF CULVERT

NOTE ON SLAB BARS.
TERMINAL ENDS OF BARS FOR THE INTERMEDIATE SECTIONS SHALL BE IN LINE WITH THOSE FOR THE END SECTION OF CULVERT

TOP SLAB FOR TABLE 1

BAR SPACES FOR 14Ø LONGITUDINAL REINF.							
s	a	b	e	f	H	c	d
1.00	2	3	1	3	1.00	3	2
1.50	3	4	1	5	1.50	4	3
2.00	4	5	2	6	2.00	5	4
2.50	5	6	2	6	2.50	6	5
3.00	6	7	2	6	3.00	7	6
3.50	7	8	2	7	-	-	-

NOTE MIN. LAP SPLICES FOR LONGIT. BARS SHALL BE 0.5m.

SCHEDULE OF EDGE BEAM				
NO.	SPAN	DIMENSIONS	MAIN REINFORCEMENT	STIRRUPS
FOR ANGLE = 90º				
1	1.00	0.50 m x 0.20 m	8 - 16 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.55 m x 0.22 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.60 m x 0.24 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.60 m x 0.28 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.60 m x 0.32 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.60 m x 0.36 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
FOR ANGLE = 60º				
1	1.00	0.50 m x 0.20 m	8 - 18 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.60 m x 0.22 m	10 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.65 m x 0.22 m	10 - 20 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.65 m x 0.28 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.65 m x 0.32 m	10 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.65 m x 0.36 m	10 - 24 E 101 (TOP & BOTTOM)	- DO -
FOR ANGLE = 45º				
1	1.00	0.70 m x 0.20 m	10 - 18 E 101 (TOP & BOTTOM)	12 S 100 @ 0.30
2	1.50	0.85 m x 0.22 m	14 - 18 E 101 (TOP & BOTTOM)	- DO -
3	2.00	0.95 m x 0.24 m	14 - 20 E 101 (TOP & BOTTOM)	- DO -
4	2.50	0.95 m x 0.26 m	14 - 22 E 101 (TOP & BOTTOM)	- DO -
5	3.00	0.95 m x 0.32 m	14 - 22 E 101 (TOP & BOTTOM)	- DO -
6	3.50	0.95 m x 0.36 m	14 - 24 E 101 (TOP & BOTTOM)	- DO -

EDGE CURB WIDTH	
EMBANKMENT SLOPE	WIDTH (WC)
6 : 1	0.60
4 : 1	0.40
3 : 1	0.30
2 : 1	0.20

BAR Ø	UNIT WT.
10	0.617
12	0.888
14	1.21
16	1.58
18	2.00
20	2.47
22	2.98
24	3.55
25	3.85

DETAIL OF THE EXTENSION OF EXISTING R.C. BOX CULVERT

Please see notes here

TYPICAL LONGITUDINAL SECTION OF CULVERT

DETAIL A
EXPANSION JOINT DETAIL

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

SLOPE = 6 : 1

S	H	W1	W2	X2
1.00	0.70	0.20	0.20	0.20
1.50	0.70	0.22	0.20	0.20
2.00	0.70	0.24	0.20	0.20
2.50	0.70	0.28	0.20	0.24
3.00	0.70	0.32	0.20	0.24
3.50	0.70	0.36	0.20	0.24

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 2 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	6	8	12	16	18	22

Slope = 3 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Slope = 4 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Note:

Outer Wing Wall Key in Slope 2 : 1 = W1 + 0.10
But for 3 : 1 & 4 : 1 = W1 + 0.20

Supervising Consultant: ***ITAL CONSULT***	**KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORTATION** **GENERAL TECHNICAL ADMINISTRATION**	MAIN CONTRACTOR: ***M. A. Al Swailem Co.***

APRON & WING WALL DETAILS

PROJECT: **DOUBLING OF JEDDAH-JIZAN ROAD** PAGE: ____ OF ____

ITEM : **5030308 CONCRETE FOR INLET & OUTLET (270/20)** DWG. NO.: _____

CULVERTwith SKEW 45 deg. **2 CELLS**

INLET & OUTLET

Section 1 - 1

Longitudinal Elevation

Ext. Wall **Int. Wall**

Front Elevation

Longitudinal Elevation

Sub-contractor: ***M. A. AL SWAILEM CO.***	**DOUBLING OF JEDDAH-JIZAN ROAD**	Consultant: ***ITAL CONSULT***
Proj. Manager Q.S.		Res. Engineer Q.S.

Culvert @ STA. 968+118.659 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.56500°	0.22918°		1.940	2.460

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	1.840	as	14	1.840	0.00	1.840	2 x 1 = 2	3.680	1.21	4.453
	H202	0.25 0.19 0.325 0.327	0.15	14	1.092	0	1.092	13 x 1 = 13	14.199	1.21	17.181
	A100	2.360	as	12	2.360	0	2.360	6 x 2 = 12	28.320	0.888	25.148
	F201	0.25 0.714 0.205 0.247	0.03 0.2	14	1.446	0	1.446	13 x 2 = 26	37.594	1.21	45.489
	F300 G300	2.360	0.15	12	2.360	0	2.360	13 x 2 = 26	61.360	0.888	54.488
	L4 F301	1.860 x=0.15	0.15	12	2.160	0	2.160	17 x 1 = 17	36.720	0.888	32.607
	L4 G301	1.860 x=0.15	0.15	12	2.160	0	2.160	17 x 1 = 17	36.720	0.888	32.607
									TOTAL FOR OUTLET APRON		**211.974**

Culvert @ STA. 968+118.659 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.56500°	0.22918°		1.940	2.460

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	2.572	as	12	2.572	0	2.572	2 x 2 = 4	10.286	0.888	9.134
	B101	0.15 ave = 0.726 0.28 max = 1.294 min = 0.159	0.15	14	1.156	0	1.156	16 x 2 = 32	37.006	1.210	44.777
	C101	0.15 ave = 0.726 0.14 max = 1.294 min = 0.159	0.15	12	1.016	0	1.016	16 x 2 = 32	32.512	0.888	28.871
	A101	ave = 1.197 max = 2.066 min = 0.328	0.15	12	1.197	0	1.197	7 x 4 = 28	33.515	0.888	29.761
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR OUTLET WING WALL		**165.398**

Culvert @ STA. 968+118.659 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.565 °			1.940	2.460
TOE WALL (OUTLET)	A205	1.840	as	14	1.840	0	1.840	20 x 1 = 20	36.800	1.21	44.528
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	13 x 1 = 13	59.670	1.21	72.201
									TOTAL FOR OUTLET TOE WALL		**116.729**

Culvert @ STA. 3+629.000 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.56500°	1.31871°		6.840	2.767

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	6.740	as	14	6.740	0.00	6.740	2 x 1 = 2	13.480	1.21	16.311
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	46 x 1 = 46	61.350	1.21	74.233
	A100	2.667	as	12	2.667	0	2.667	6 x 3 = 18	48.006	0.888	42.629
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	14 x 2 = 28	50.778	1.21	61.441
	F202	0.25 0.25 0.346 0.334 0.346	0.2	14	1.527	0	1.527	14 x 1 = 14	21.378	1.21	25.867
	F300 G300	2.667	0.15	12	2.667	0	2.667	42 x 2 = 84	224.028	0.888	198.937
	L4 F301	6.760 x=0.15	0.15	12	7.060	0	7.060	19 x 1 = 19	134.140	0.888	119.116
	L4 G301	6.760 x=0.15	0.15	12	7.060	0	7.060	19 x 1 = 19	134.140	0.888	119.116
									TOTAL FOR OUTLET APRON		**657.650**

Culvert @ STA. 3+629.000 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.56500°	1.31871°		6.840	2.767

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	2.891	as	12	2.891	0	2.891	2 x 3 = 6	17.345	0.888	15.403
	B101	0.15 ave = 0.776 0.38 max = 1.394 min = 0.157	0.15	14	1.306	0	1.306	18 x 2 = 36	47.01	1.210	56.879
	C101	0.15 ave = 0.776 0.24 max = 1.394 min = 0.157	0.15	12	1.166	0	1.166	18 x 2 = 36	41.97	0.888	37.267
	D101	0.15 ave = 0.776 0.26 max = 1.394 min = 0.157	0.15	14	1.186	0	1.186	18 x 2 = 36	42.69	1.210	51.652
	A101	ave = 1.345 max = 2.361 min = 0.328	0.15	12	1.345	0	1.345	7 x 6 = 42	56.470	0.888	50.145
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	9 x 2 = 18	20.509	0.888	18.212
	B109	0.300 1.62	as	20	1.920	0	1.920	1 x 2 = 2	3.840	2.47	9.485
	B110	0.300 1.62	as	20	1.920	0	1.920	1 x 2 = 2	3.840	2.47	9.485
	B116	0.300 1.62	as	20	1.920	0	1.920	2 x 2 = 4	7.680	2.47	18.970
	C189	0.300 1.62	as	12	1.920	0	1.920	1 x 2 = 2	3.840	0.888	3.410
	C190	0.300 1.62	as	12	1.920	0	1.920	1 x 2 = 2	3.840	0.888	3.410
	D135	0.300 1.62	as	16	1.920	0	1.920	2 x 1 = 2	3.840	1.58	6.067
	D136	0.300 1.62	as	16	1.920	0	1.920	2 x 1 = 2	3.840	1.58	6.067
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	8 x 1 = 8	5.760	0.888	5.115
									TOTAL FOR OUTLET WING WALL		**291.566**

Culvert @ STA. 3+629.000 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.32	0.20	26.565 °			6.840	2.767
TOE WALL (OUTLET)	A205	6.740	as	14	6.740	0	6.740	20 x 1 = 20	134.800	1.21	163.108
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	46 x 1 = 46	211.140	1.21	255.479
									TOTAL FOR OUTLET TOE WALL		**418.587**

Culvert @ STA. 972+753.210 skew 45 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.50	1.00	0.26	0.22	0.22	0.00	23.41300°	2.29060°		3.940	3.104

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	5.431	as	14	5.431	0.00	5.431	2 x 1 = 2	10.861	1.21	13.142
	H202	0.25 0.24 0.560 0.462	0.15	14	1.512	0	1.512	27 x 1 = 27	40.836	1.21	49.412
	A100	2.963	as	12	2.963	0	2.963	6 x 2 = 12	35.551	0.888	31.569
	F201	0.25 0.714 0.276 0.247	0.08 0.2	14	1.567	0	1.567	16 x 2 = 32	50.132	1.21	60.660
	F300 G300	2.963	0.15	12	2.963	0	2.963	27 x 2 = 54	159.979	0.888	142.062
	L3 F301	ave = 2.159 x=0.15 max = 3.629 min = 0.689	0.2	12	2.309	0	2.309	17 x 2 = 34	78.516	0.888	69.722
	L3 G301	ave = 2.159 x=0.15 max = 3.629 min = 0.689	0.2	12	2.309	0	2.309	17 x 2 = 34	78.516	0.888	69.722
	L4 F301	3.860 x=0.15	0.2	12	4.160	0	4.160	-3 x 1 = -3	-12.480	0.888	-11.082
	L4 G301	3.860 x=0.15	0.2	12	4.160	0	4.160	-3 x 1 = -3	-12.480	0.888	-11.082
										TOTAL FOR OUTLET APRON	**414.124**

Culvert @ STA. 972+753.210 skew 45 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.50	1.00	0.26	0.22	0.22	0.00	23.41300°	2.29060°		3.940	3.104

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	3.159	as	12	3.159	0	3.159	2 x 2 = 4	12.635	0.888	11.220
	B101	0.15 ave = 0.726 0.28 max = 1.302 min = 0.151	0.15	14	1.156	0	1.156	21 x 2 = 42	48.57	1.210	58.770
	C101	0.15 ave = 0.726 0.14 max = 1.302 min = 0.151	0.15	12	1.016	0	1.016	21 x 2 = 42	42.69	0.888	37.909
	A101	ave = 1.514 max = 2.633 min = 0.395	0.15	12	1.514	0	1.514	7 x 4 = 28	42.390	0.888	37.642
	A300	0.280 0.06 0.140 0.5	0.15	12	0.980	0	0.980	8 x 2 = 16	15.680	0.888	13.924
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR OUTLET WING WALL		**199.561**

Culvert @ STA. 972+753.210 skew 45 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.50	1.00	0.26	0.22	0.22	0.00	23.413 °			3.940	3.104

TOE WALL (OUTLET)	A205	5.431	as	14	5.431	0	5.431	20 x 1 = 20	108.611	1.21	131.420
	A204	0.212 0.948 1.800 0.240	0.15	14	5.000	0	5.000	37 x 1 = 37	185.003	1.21	223.853
									TOTAL FOR OUTLET TOE WALL		**355.273**

Culvert @ STA. 6+060 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.36	0.22	16.10200°	2.50270°		6.940	4.637

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	7.898	as	14	7.898	0.00	7.898	2 x 1 = 2	15.796	1.21	19.114
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	47 x 1 = 47	74.642	1.21	90.317
	A100	4.522	as	12	4.522	0	4.522	6 x 3 = 18	81.388	0.888	72.272
	F201	0.25 0.754 0.417 0.487	0.18 0.2	14	2.088	0	2.088	24 x 2 = 48	100.230	1.21	121.278
	F202	0.25 0.25 0.417 0.354	0.2 0.417	14	1.688	0	1.688	24 x 1 = 24	40.521	1.21	49.031
	F300 G300	4.522	0.30	12	4.522	0	4.522	24 x 2 = 48	217.033	0.888	192.726
	L3 F301	ave = 3.610 x=0.15 max = 6.454 min = 0.766	0.2	12	3.760	0	3.760	19 x 2 = 38	142.873	0.888	126.871
	L3 G301	ave = 3.610 x=0.15 max = 6.454 min = 0.766	0.2	12	3.760	0	3.760	19 x 2 = 38	142.873	0.888	126.871
	L4 F301	6.860 x=0.15	0.2	12	7.160	0	7.160	4 x 1 = 4	28.640	0.888	25.432
	L4 G301	6.860 x=0.15	0.2	12	7.160	0	7.160	4 x 1 = 4	28.640	0.888	25.432
									TOTAL FOR OUTLET APRON		**849.343**

Culvert @ STA. 6+060 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.36	0.22	16.10200°	2.50270°		6.940	4.637

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	4.644	as	12	4.644	0	4.644	2 x 3 = 6	27.864	0.888	24.743
	B101	0.15 ave = 0.778 0.52 max = 1.416 min = 0.140	0.15	14	1.448	0	1.448	31 x 2 = 62	89.79	1.210	108.640
	C101	0.15 ave = 0.778 0.28 max = 1.416 min = 0.140	0.15	12	1.208	0	1.208	31 x 2 = 62	74.91	0.888	66.516
	D101	0.15 ave = 0.778 0.28 max = 1.416 min = 0.140	0.15	14	1.208	0	1.208	31 x 2 = 62	74.91	1.210	90.635
	A101	ave = 2.031 max = 3.940 min = 0.121	0.15	12	2.031	0	2.031	8 x 6 = 48	97.470	0.888	86.554
	A300	0.457 0.06 0.280 0.5	0.15	12	1.297	0	1.297	9 x 2 = 18	23.350	0.888	20.735
	B109	0.300 1.62	as	20	1.920	0	1.920	1 x 2 = 2	3.840	2.47	9.485
	B110	0.300 1.62	as	20	1.920	0	1.920	1 x 2 = 2	3.840	2.47	9.485
	B116	0.300 1.62	as	20	1.920	0	1.920	2 x 2 = 4	7.680	2.47	18.970
	C189	0.300 1.62	as	12	1.920	0	1.920	1 x 2 = 2	3.840	0.888	3.410
	C190	0.300 1.62	as	12	1.920	0	1.920	1 x 2 = 2	3.840	0.888	3.410
	D135	0.300 1.62	as	16	1.920	0	1.920	2 x 1 = 2	3.840	1.58	6.067
	D136	0.300 1.62	as	16	1.920	0	1.920	2 x 1 = 2	3.840	1.58	6.067
	E300	0.300 0.140 0.300	0.15	12	0.740	0	0.740	8 x 1 = 8	5.920	0.888	5.257
									TOTAL FOR OUTLET WING WALL		**459.973**

Culvert @ STA. 6+060 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	3.00	1.00	0.36	0.32	0.36	0.22	16.102 °			6.940	4.637
TOE WALL (OUTLET)	A205	7.898	as	14	7.898	0	7.898	20 x 1 = 20	157.963	1.21	191.135
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	54 x 1 = 54	256.130	1.21	309.918
									TOTAL FOR OUTLET TOE WALL		**501.053**

Culvert @ STA. 44+298.920 skew 45 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.20	26.56500°	2.22196°		1.940	1.750

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	2.602	as	14	2.602	0.00	2.602	2 x 1 = 2	5.204	1.21	6.297
	H202	0.25 0.19 0.460 0.462	0.15	14	1.362	0	1.362	13 x 1 = 13	17.712	1.21	21.431
	A100	1.609	as	12	1.609	0	1.609	6 x 2 = 12	19.303	0.888	17.141
	F201	0.25 0.714 0.205 0.247	0.03 0.2	14	1.446	0	1.446	9 x 2 = 18	26.027	1.21	31.492
	F300 G300	1.609	0.15	12	1.609	0	1.609	13 x 2 = 26	41.823	0.888	37.139
	L3 F301	ave = 1.234 x=0.15 max = 1.609 min = 0.859	0.15	12	1.384	0	1.384	6 x 2 = 12	16.603	0.888	14.743
	L3 G301	ave = 1.234 x=0.15 max = 1.609 min = 0.859	0.15	12	1.384	0	1.384	6 x 2 = 12	16.603	0.888	14.743
	L4 F301	1.609	0.15	12	1.609	0	1.609	1 x 1 = 1	1.609	0.888	1.428
	L4 G301	1.609	0.15	12	1.609	0	1.609	1 x 1 = 1	1.609	0.888	1.428
									TOTAL FOR INLET APRON		145.844

Overlap

No Overlap

Culvert @ STA. 44+298.920 **skew** **45 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.20	26.56500°	-2.22196°		1.940	1.750

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	1.966	as	12	1.966	0	1.966	2 x 2 = 4	7.864	0.888	6.983
	B101	0.15 ave = 0.729 0.28 max = 1.295 min = 0.163	0.15	14	1.159	0	1.159	12 x 2 = 24	27.81	1.210	33.654
	C101	0.15 ave = 0.729 0.14 max = 1.295 min = 0.163	0.15	12	1.019	0	1.019	12 x 2 = 24	24.45	0.888	21.714
	A101	ave = 0.855 max = 1.382 min = 0.328	0.15	12	0.855	0	0.855	7 x 4 = 28	23.940	0.888	21.259
	A300	0.280 0.06 0.140 0.5	0.15	12	0.980	0	0.980	8 x 2 = 16	15.680	0.888	13.924
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR INLET WING WALL		**137.630**

Culvert @ STA. 44+298.920 **skew** **45 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.20	26.565 °			1.940	1.750
TOE WALL (INLET)	A205	2.602	as	14	2.602	0	2.602	10 x 1 = 10	26.021	1.21	31.486
	A203	0.212 0.948 0.800 0.240	0.15	14	3.000	0	3.000	18 x 1 = 18	54.001	1.21	65.341
									TOTAL FOR INLET TOE WALL		**96.827**

Culvert @ STA. 44+298.920 skew 45 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	26.56500°	2.22196°		3.640	2.264

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	5.006	as	14	5.006	0.00	5.006	2 x 1 = 2	10.013	1.21	12.115
	H202	0.25 0.19 0.460 0.462	0.15	14	1.362	0	1.362	25 x 1 = 25	34.061	1.21	41.214
	A100	2.123	as	12	2.123	0	2.123	6 x 3 = 18	38.206	0.888	33.927
	F201	0.25 0.714 0.205 0.247	0.03 0.2	14	1.446	0	1.446	12 x 2 = 24	34.702	1.21	41.990
	F202	0.25 0.25 0.205 0.334	0.2 0.205	14	1.244	0	1.244	12 x 1 = 12	14.929	1.21	18.065
	F300 G300	2.123	0.15	12	2.123	0	2.123	22 x 2 = 44	93.393	0.888	82.933
	L3 F301	ave = 1.448 x=0.15 max = 2.123 min = 0.773	0.15	12	1.598	0	1.598	10 x 2 = 20	31.952	0.888	28.373
	L3 G301	ave = 1.448 x=0.15 max = 2.123 min = 0.773	0.15	12	1.598	0	1.598	10 x 2 = 20	31.952	0.888	28.373
	L4 F301	2.123	0.15	12	2.123	0	2.123	9 x 1 = 9	19.103	0.888	16.964
	L4 G301	2.123	0.15	12	2.123	0	2.123	9 x 1 = 9	19.103	0.888	16.964
									TOTAL FOR INLET APRON		320.918

Overlap

No Overlap

Culvert @ STA. 44+298.920 **skew** **45 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	26.56500°	-2.22196°		3.640	2.264

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	2.399	as	12	2.399	0	2.399	2 x 3 = 6	14.392	0.888	12.780
	B101	0.15 ave = 0.729 0.28 max = 1.295 min = 0.163	0.15	14	1.159	0	1.159	15 x 2 = 30	34.77	1.210	42.067
	C101	0.15 ave = 0.729 0.14 max = 1.295 min = 0.163	0.15	12	1.019	0	1.019	15 x 2 = 30	30.57	0.888	27.143
	D101	0.15 ave = 0.729 0.30 max = 1.295 min = 0.163	0.15	14	1.179	0	1.179	15 x 2 = 30	35.37	1.210	42.793
	A101	ave = 1.112 max = 1.896 min = 0.328	0.15	12	1.112	0	1.112	7 x 6 = 42	46.713	0.888	41.481
	A300	0.280 0.06 0.140 0.5	0.15	12	0.980	0	0.980	8 x 2 = 16	15.680	0.888	13.924
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	D135	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	D136	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	7 x 1 = 7	5.040	0.888	4.476
										TOTAL FOR INLET WING WALL	235.630

Culvert @ STA. 44+298.920 **skew** **45 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	26.565 °			3.640	2.264
TOE WALL (INLET)	A205	5.006	as	14	5.006	0	5.006	10 x 1 = 10	50.063	1.21	60.576
	A203	0.212 0.948 0.800 0.240	0.15	14	3.000	0	3.000	34 x 1 = 34	102.002	1.21	123.423
										TOTAL FOR INLET TOE WALL	183.999

Culvert @ STA. 5+450.800 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	2.50	2.00	0.32	0.28	0.28	0.00	18.43478°	0.01625°		3.060	6.846

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	2.960	as	14	2.960	0.00	2.960	2 x 1 = 2	5.920	1.21	7.163
	H202	0.25 0.30 0.481 0.327	0.15	14	1.358	0	1.358	21 x 1 = 21	28.514	1.21	34.503
	A100	6.746	as	12	6.746	0	6.746	6 x 2 = 12	80.952	0.888	71.885
	F201	0.25 0.728 0.361 0.407	0.14 0.2	14	1.886	0	1.886	35 x 2 = 70	131.994	1.21	159.713
	F300 G300	6.746	0.30	12	6.746	0	6.746	13 x 2 = 26	175.396	0.888	155.752
	L4 F301	2.980 x=0.15	0.2	12	3.280	0	3.280	35 x 1 = 35	114.800	0.888	101.942
	L4 G301	2.980 x=0.15	0.2	12	3.280	0	3.280	35 x 1 = 35	114.800	0.888	101.942
										TOTAL FOR OUTLET APRON	**632.901**

Culvert @ STA. 5+450.800 **skew** **90** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	2.50	2.00	0.32	0.28	0.28	0.00	18.43478°	0.01625°		3.060	6.846

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.039	as	12	7.039	0	7.039	2 x 2 = 4	28.154	0.888	25.001
	B101-18Ø	0.15 ave = 2.271 0.44 max = 2.371 min = 2.171	0.15	18	2.861	0	2.861	5 x 2 = 10	28.61	2.000	57.214
	B101-14Ø	0.15 ave = 1.134 0.44 max = 2.121 min = 0.147	0.15	14	1.724	0	1.724	41 x 2 = 82	141.37	1.210	171.059
	C101	0.15 ave = 1.259 0.20 max = 2.371 min = 0.147	0.15	12	1.609	0	1.609	46 x 2 = 92	148.02	0.888	131.445
	A101	ave = 3.200 max = 6.307 min = 0.092	0.15	12	3.200	0	3.200	15 x 4 = 60	191.981	0.888	170.479
	A300	0.283 0.06 0.200 0.5	0.15	12	1.043	0	1.043	15 x 2 = 30	31.285	0.888	27.781
	B109	0.300 2.54	as	20	2.840	0	2.840	1 x 2 = 2	5.680	2.47	14.030
	B110	0.300 2.54	as	20	2.840	0	2.840	1 x 2 = 2	5.680	2.47	14.030
	B116	0.300 2.54	as	20	2.840	0	2.840	2 x 2 = 4	11.360	2.47	28.059
	C189	0.300 2.54	as	12	2.840	0	2.840	1 x 2 = 2	5.680	0.888	5.044
	C190	0.300 2.54	as	12	2.840	0	2.840	1 x 2 = 2	5.680	0.888	5.044
									TOTAL FOR OUTLET WING WALL		**649.186**

Culvert @ STA. 5+450.800 **skew** **90** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	2.50	2.00	0.32	0.28	0.28	0.00	18.435 °			3.060	6.846
TOE WALL (OUTLET)	A205	2.960	as	14	2.960	0	2.960	20 x 1 = 20	59.200	1.21	71.632
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	21 x 1 = 21	96.390	1.21	116.632
									TOTAL FOR OUTLET TOE WALL		**188.264**

Culvert @ STA. 973+718.458 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		6.900	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	6.800	as	14	6.800	0.00	6.800	2 x 1 = 2	13.600	1.21	16.456
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	46 x 1 = 46	61.350	1.21	74.233
	A100	4.764	as	12	4.764	0	4.764	6 x 3 = 18	85.752	0.888	76.148
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	25 x 2 = 50	90.674	1.21	109.716
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	25 x 1 = 25	39.674	1.21	48.006
	F300 G300	4.764	0.15	12	4.764	0	4.764	42 x 2 = 84	400.176	0.888	355.356
	L4 F301	6.820 x=0.15	0.15	12	7.120	0	7.120	33 x 1 = 33	234.960	0.888	208.644
	L4 G301	6.820 x=0.15	0.15	12	7.120	0	7.120	33 x 1 = 33	234.960	0.888	208.644
										TOTAL FOR OUTLET APRON	1097.204

Culvert @ STA. 973+718.458 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		6.900	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	5.214	as	12	5.214	0	5.214	2 x 3 = 6	31.284	0.888	27.781
	B101-18Ø	0.15 ave = 2.252 0.38 max = 2.395 min = 2.109	0.15	18	2.782	0	2.782	5 x 2 = 10	27.82	2.000	55.633
	B101-14Ø	0.15 ave = 1.095 0.38 max = 2.034 min = 0.157	0.15	14	1.625	0	1.625	27 x 2 = 54	87.77	1.210	106.196
	C101	0.15 ave = 1.276 0.24 max = 2.395 min = 0.157	0.15	12	1.666	0	1.666	32 x 2 = 64	106.62	0.888	94.676
	D101-16Ø	0.15 ave = 2.252 0.32 max = 2.395 min = 2.109	0.15	16	2.722	0	2.722	5 x 2 = 10	27.22	1.580	43.002
	D101-14Ø	0.15 ave = 1.095 0.32 max = 2.034 min = 0.157	0.15	14	1.565	0	1.565	27 x 2 = 54	84.53	1.210	102.276
	A101	ave = 2.393 max = 4.458 min = 0.328	0.15	12	2.393	0	2.393	14 x 6 = 84	201.037	0.888	178.521
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	16 x 2 = 32	36.461	0.888	32.378
	B109	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B110	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B116	0.300 2.62	as	20	2.920	0	2.920	2 x 2 = 4	11.680	2.47	28.850
	C189	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
	C190	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
	D135	0.300 2.62	as	16	2.920	0	2.920	2 x 1 = 2	5.840	1.58	9.227
	D136	0.300 2.62	as	16	2.920	0	2.920	2 x 1 = 2	5.840	1.58	9.227
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	2 x 1 = 2	1.560	0.888	1.385
									TOTAL FOR OUTLET WING WALL		**728.373**

Culvert @ STA. 973+718.458 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.565 °			6.900	4.864
TOE WALL (OUTLET)	A205	6.800	as	14	6.800	0	6.800	20 x 1 = 20	136.000	1.21	164.560
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	46 x 1 = 46	211.140	1.21	255.479
									TOTAL FOR OUTLET TOE WALL		**420.039**

Culvert @ STA. 973+718.458 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	4.088	as	14	4.088	0.00	4.088	2 x 1 = 2	8.175	1.21	9.892
	H202	0.25 0.29 0.539 0.378	0.15	14	1.456	0	1.456	25 x 1 = 25	36.412	1.21	44.058
	A100	4.749	as	12	4.749	0	4.749	6 x 2 = 12	56.982	0.888	50.600
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	25 x 2 = 50	90.674	1.21	109.716
	F300 G300	4.749	0.15	12	4.749	0	4.749	23 x 2 = 46	218.432	0.888	193.968
	L3 F301	ave = 1.983 x=0.15 max = 3.240 min = 0.726	0.15	14	2.133	0	2.133	12 x 2 = 24	51.195	1.21	61.946
	L3 G301	ave = 1.983 x=0.15 max = 3.240 min = 0.726	0.15	12	2.133	0	2.133	12 x 2 = 24	51.195	0.888	45.461
	L4 F301	3.560 x=0.15	0.15	14	3.860	0	3.860	19 x 1 = 19	73.340	1.21	88.741
	L4 G301	3.560 x=0.15	0.15	12	3.860	0	3.860	19 x 1 = 19	73.340	0.888	65.126
									TOTAL FOR OUTLET APRON		**669.508**

Culvert @ STA. 973+718.458 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	5.214	as	12	5.214	0	5.214	2 x 2 = 4	20.856	0.888	18.520
	B101-18Ø	0.15 ave = 2.252 0.38 max = 2.395 min = 2.109	0.15	18	2.782	0	2.782	5 x 2 = 10	27.82	2.000	55.633
	B101-14Ø	0.15 ave = 1.095 0.38 max = 2.034 min = 0.157	0.15	14	1.625	0	1.625	27 x 2 = 54	87.77	1.210	106.196
	C101	0.15 ave = 1.276 0.24 max = 2.395 min = 0.157	0.15	12	1.666	0	1.666	32 x 2 = 64	106.62	0.888	94.676
	A101	ave = 2.393 max = 4.458 min = 0.328	0.15	12	2.393	0	2.393	14 x 4 = 56	134.025	0.888	119.014
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	16 x 2 = 32	38.141	0.888	33.870
	B109	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B110	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B116	0.300 2.62	as	20	2.920	0	2.920	2 x 2 = 4	11.680	2.47	28.850
	C189	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
	C190	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
									TOTAL FOR OUTLET WING WALL		**495.980**

Culvert @ STA. 973+718.458 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.00	0.36	0.32	0.32	0.00	26.565 °			3.640	4.864

TOE WALL (OUTLET)	A205	4.088	as	14	4.088	0	4.088	20 x 1 = 20	81.753	1.21	98.921
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	28 x 1 = 28	132.808	1.21	160.698
									TOTAL FOR OUTLET TOE WALL		**259.619**

Culvert @ STA. 973+718.458 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		6.900	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	7.852	as	14	7.852	0.00	7.852	2 x 1 = 2	15.704	1.21	19.002
	H202	0.25 0.29 0.539 0.378	0.15	14	1.456	0	1.456	46 x 1 = 46	66.998	1.21	81.067
	A100	4.749	as	12	4.749	0	4.749	6 x 3 = 18	85.474	0.888	75.901
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	25 x 2 = 50	90.674	1.21	109.716
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	25 x 1 = 25	39.674	1.21	48.006
	F300 G300	4.749	0.15	12	4.749	0	4.749	42 x 2 = 84	398.877	0.888	354.202
	L3 F301	ave = 3.613 x=0.15 max = 6.500 min = 0.726	0.15	12	3.763	0	3.763	24 x 2 = 48	180.632	0.888	160.401
	L3 G301	ave = 3.613 x=0.15 max = 6.500 min = 0.726	0.15	12	3.763	0	3.763	24 x 2 = 48	180.632	0.888	160.401
	L4 F301	6.820 x=0.15	0.15	12	7.120	0	7.120	7 x 1 = 7	49.840	0.888	44.258
	L4 G301	6.820 x=0.15	0.15	12	7.120	0	7.120	7 x 1 = 7	49.840	0.888	44.258
									TOTAL FOR OUTLET APRON		1097.211

Culvert @ STA. 973+718.458 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		6.900	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	5.214	as	12	5.214	0	5.214	2 x 3 = 6	31.284	0.888	27.781
	B101-18Ø	0.15 ave = 2.252 0.38 max = 2.395 min = 2.109	0.15	18	2.782	0	2.782	5 x 2 = 10	27.82	2.000	55.633
	B101-14Ø	0.15 ave = 1.095 0.38 max = 2.034 min = 0.157	0.15	14	1.625	0	1.625	27 x 2 = 54	87.77	1.210	106.196
	C101	0.15 ave = 1.276 0.24 max = 2.395 min = 0.157	0.15	12	1.666	0	1.666	32 x 2 = 64	106.62	0.888	94.676
	D101-16Ø	0.15 ave = 2.252 0.32 max = 2.395 min = 2.109	0.15	16	2.722	0	2.722	5 x 2 = 10	27.22	1.580	43.002
	D101-14Ø	0.15 ave = 1.095 0.32 max = 2.034 min = 0.157	0.15	14	1.565	0	1.565	27 x 2 = 54	84.53	1.210	102.276
	A101	ave = 2.393 max = 4.458 min = 0.328	0.15	12	2.393	0	2.393	14 x 6 = 84	201.037	0.888	178.521
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	16 x 2 = 32	38.141	0.888	33.870
	B109	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B110	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B116	0.300 2.62	as	20	2.920	0	2.920	2 x 2 = 4	11.680	2.47	28.850
	C189	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
	C190	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
	D135	0.300 2.62	as	16	2.920	0	2.920	2 x 1 = 2	5.840	1.58	9.227
	D136	0.300 2.62	as	16	2.920	0	2.920	2 x 1 = 2	5.840	1.58	9.227
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	15 x 1 = 15	11.700	0.888	10.390
									TOTAL FOR OUTLET WING WALL		**738.869**

Culvert @ STA. 973+718.458 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.565 °			6.900	4.864
TOE WALL (OUTLET)	A205	7.852	as	14	7.852	0	7.852	20 x 1 = 20	157.039	1.21	190.017
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	53 x 1 = 53	251.387	1.21	304.178
									TOTAL FOR OUTLET TOE WALL		**494.196**

Culvert @ STA. 973+718.458 skew 30 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	7.080	as	14	7.080	0.00	7.080	2 x 1 = 2	14.160	1.21	17.134
	H202	0.25 0.29 0.933 0.654	0.15	14	2.127	0	2.127	25 x 1 = 25	53.184	1.21	64.353
	A100	4.664	as	12	4.664	0	4.664	6 x 2 = 12	55.968	0.888	49.700
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	25 x 2 = 50	90.674	1.21	109.716
	F300 G300	4.664	0.15	12	4.664	0	4.664	23 x 2 = 46	214.544	0.888	190.515
	L3 F301	ave = 1.567 x=0.15 max = 2.693 min = 0.441	0.15	14	1.717	0	1.717	27 x 2 = 54	92.715	1.21	112.185
	L3 G301	ave = 1.567 x=0.15 max = 2.693 min = 0.441	0.15	12	1.717	0	1.717	27 x 2 = 54	92.715	0.888	82.331
	L4 F301	2.693	0.15	14	2.693	0	2.693	9 x 1 = 9	24.235	1.21	29.324
	L4 G301	2.693	0.15	12	2.693	0	2.693	9 x 1 = 9	24.235	0.888	21.521
										TOTAL FOR OUTLET APRON	676.778

Overlap

No Overlap

Culvert @ STA. 973+718.458 **skew** **30** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	5.214	as	12	5.214	0	5.214	2 x 2 = 4	20.856	0.888	18.520
	B101-18Ø	0.15 ave = 2.252 0.38 max = 2.395 min = 2.109	0.15	18	2.782	0	2.782	5 x 2 = 10	27.82	2.000	55.633
	B101-14Ø	0.15 ave = 1.095 0.38 max = 2.034 min = 0.157	0.15	14	1.625	0	1.625	27 x 2 = 54	87.77	1.210	106.196
	C101	0.15 ave = 1.276 0.24 max = 2.395 min = 0.157	0.15	12	1.666	0	1.666	32 x 2 = 64	106.62	0.888	94.676
	A101	ave = 2.393 max = 4.458 min = 0.328	0.15	12	2.393	0	2.393	14 x 4 = 56	134.025	0.888	119.014
	A300	0.679 0.06 0.240 0.5	0.15	12	1.479	0	1.479	16 x 2 = 32	47.322	0.888	42.022
	B109	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B110	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B116	0.300 2.62	as	20	2.920	0	2.920	2 x 2 = 4	11.680	2.47	28.850
	C189	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
	C190	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
									TOTAL FOR OUTLET WING WALL		**504.133**

Culvert @ STA. 973+718.458 **skew** **30** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.00	0.36	0.32	0.32	0.00	26.565 °			3.640	4.864

TOE WALL (OUTLET)	A205	7.080	as	14	7.080	0	7.080	20 x 1 = 20	141.600	1.21	171.336
	A204	0.300 1.340 1.800 0.340	0.15	14	5.580	0	5.580	48 x 1 = 48	267.840	1.21	324.086
									TOTAL FOR OUTLET TOE WALL		**495.422**

Culvert @ STA. 973+718.458 skew 30 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		6.900	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	14.440	as	14	14.440	0.00	14.440	2 x 1 = 2	28.880	1.21	34.945
	H202	0.25 0.29 0.933 0.654	0.15	14	2.127	0	2.127	46 x 1 = 46	97.859	1.21	118.410
	A100	4.664	as	12	4.664	0	4.664	6 x 3 = 18	83.952	0.888	74.549
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	25 x 2 = 50	90.674	1.21	109.716
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	25 x 1 = 25	39.674	1.21	48.006
	F300 G300	4.664	0.15	12	4.664	0	4.664	42 x 2 = 84	391.776	0.888	347.897
	L3 F301	ave = 1.567 x=0.15 max = 2.693 min = 0.441	0.15	12	1.717	0	1.717	27 x 2 = 54	92.715	0.888	82.331
	L3 G301	ave = 1.567 x=0.15 max = 2.693 min = 0.441	0.15	12	1.717	0	1.717	27 x 2 = 54	92.715	0.888	82.331
	L4 F301	2.693	0.15	12	2.693	0	2.693	47 x 1 = 47	126.560	0.888	112.385
	L4 G301	2.693	0.15	12	2.693	0	2.693	47 x 1 = 47	126.560	0.888	112.385
									TOTAL FOR OUTLET APRON		1122.955

Overlap

No Overlap

Culvert @ STA. 973+718.458 **skew** **30 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		6.900	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	5.214	as	12	5.214	0	5.214	2 x 3 = 6	31.284	0.888	27.781
	B101-18Ø	0.15 ave = 0.38 2.252 max = 2.395 min = 2.109	0.15	18	2.782	0	2.782	5 x 2 = 10	27.82	2.000	55.633
	B101-14Ø	0.15 ave = 0.38 1.095 max = 2.034 min = 0.157	0.15	14	1.625	0	1.625	27 x 2 = 54	87.77	1.210	106.196
	C101	0.15 ave = 0.24 1.276 max = 2.395 min = 0.157	0.15	12	1.666	0	1.666	32 x 2 = 64	106.62	0.888	94.676
	D101-16Ø	0.15 ave = 0.32 2.252 max = 2.395 min = 2.109	0.15	16	2.722	0	2.722	5 x 2 = 10	27.22	1.580	43.002
	D101-14Ø	0.15 ave = 0.32 1.095 max = 2.034 min = 0.157	0.15	14	1.565	0	1.565	27 x 2 = 54	84.53	1.210	102.276
	A101	ave = 2.393 max = 4.458 min = 0.328	0.15	12	2.393	0	2.393	14 x 6 = 84	201.037	0.888	178.521
	A300	0.679 0.06 0.240 0.5	0.15	12	1.479	0	1.479	16 x 2 = 32	47.322	0.888	42.022
	B109	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B110	0.300 2.62	as	20	2.920	0	2.920	1 x 2 = 2	5.840	2.47	14.425
	B116	0.300 2.62	as	20	2.920	0	2.920	2 x 2 = 4	11.680	2.47	28.850
	C189	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
	C190	0.300 2.62	as	12	2.920	0	2.920	1 x 2 = 2	5.840	0.888	5.186
	D135	0.300 2.62	as	16	2.920	0	2.920	2 x 1 = 2	5.840	1.58	9.227
	D136	0.300 2.62	as	16	2.920	0	2.920	2 x 1 = 2	5.840	1.58	9.227
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	15 x 1 = 15	11.700	0.888	10.390
									TOTAL FOR OUTLET WING WALL		**747.022**

Culvert @ STA. 973+718.458 **skew** **30 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	3.00	2.00	0.36	0.32	0.32	0.26	26.565 °			6.900	4.864
TOE WALL (OUTLET)	A205	14.440	as	14	14.440	0	14.440	20 x 1 = 20	288.799	1.21	349.447
	A204	0.300 1.340 1.800 0.340	0.15	14	5.580	0	5.580	92 x 1 = 92	513.360	1.21	621.165
									TOTAL FOR OUTLET TOE WALL		**970.612**

Culvert @ STA. 973+718.458 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	5.912

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	3.540	as	14	3.540	0.00	3.540	2 x 1 = 2	7.080	1.21	8.567
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	25 x 1 = 25	33.342	1.21	40.344
	A100	5.812	as	12	5.812	0	5.812	6 x 2 = 12	69.744	0.888	61.933
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	30 x 2 = 60	108.809	1.21	131.659
	F300 G300	5.812	0.15	12	5.812	0	5.812	23 x 2 = 46	267.352	0.888	237.409
	L4 F301	3.560 x=0.15	0.15	14	3.860	0	3.860	40 x 1 = 40	154.400	1.21	186.824
	L4 G301	3.560 x=0.15	0.15	12	3.860	0	3.860	40 x 1 = 40	154.400	0.888	137.107
									TOTAL FOR OUTLET APRON		**803.842**

W.W.(2.5 H)

Culvert @ STA. 973+718.458 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	5.912

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.375	as	12	6.375	0	6.375	2 x 2 = 4	25.501	0.888	22.645
	B101-18Ø	0.15 ave = 2.466 0.38 max = 2.895 min = 2.036	0.15	18	2.996	0	2.996	13 x 2 = 26	77.88	2.000	155.769
	B101-14Ø	0.15 ave = 1.059 0.38 max = 1.961 min = 0.157	0.15	14	1.589	0	1.589	26 x 2 = 52	82.64	1.210	99.989
	C101	0.15 ave = 1.526 0.24 max = 2.895 min = 0.157	0.15	12	1.916	0	1.916	39 x 2 = 78	149.44	0.888	132.707
	A101	ave = 2.917 max = 5.507 min = 0.328	0.15	12	2.917	0	2.917	17 x 4 = 68	198.386	0.888	176.167
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
										TOTAL FOR OUTLET WING WALL	**705.452**

Culvert @ STA. 973+718.458 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.565 °			3.640	5.912
TOE WALL (OUTLET)	A205	3.540	as	14	3.540	0	3.540	20 x 1 = 20	70.800	1.21	85.668
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	25 x 1 = 25	114.750	1.21	138.848
										TOTAL FOR OUTLET TOE WALL	**224.516**

Culvert @ STA. 973+718.458 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		13.420	5.738

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	14.160	as	14	14.160	0.00	14.160	2 x 1 = 2	28.320	1.21	34.267
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	90 x 1 = 90	120.032	1.21	145.239
	A100	5.638	as	12	5.638	0	5.638	6 x 5 = 30	169.140	0.888	150.196
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	29 x 2 = 58	105.182	1.21	127.270
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	29 x 3 = 87	138.066	1.21	167.060
	F300 G300	5.638	0.15	12	5.638	0	5.638	80 x 2 = 160	902.080	0.888	801.047
	L4 F301	14.180 x=0.15	0.15	14	14.480	0	14.480	39 x 1 = 39	564.720	1.21	683.311
	L4 G301	14.180 x=0.15	0.15	12	14.480	0	14.480	39 x 1 = 39	564.720	0.888	501.471
										TOTAL FOR OUTLET APRON	**2609.862**

Culvert @ STA. 973+718.458 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56500°	0.49004°		13.420	5.738

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.219	as	12	6.219	0	6.219	2 x 5 = 10	62.190	0.888	55.224
	B101-18Ø	0.15 ave = 2.452 0.38 max = 2.894 min = 2.010	0.15	18	2.982	0	2.982	13 x 2 = 26	77.53	2.000	155.059
	B101-14Ø	0.15 ave = 1.046 0.38 max = 1.935 min = 0.158	0.15	14	1.576	0	1.576	25 x 2 = 50	78.82	1.210	95.376
	C101	0.15 ave = 1.526 0.24 max = 2.894 min = 0.158	0.15	12	1.916	0	1.916	38 x 2 = 76	145.64	0.888	129.325
	D101-16Ø	0.15 ave = 2.452 0.32 max = 2.894 min = 2.010	0.15	16	2.922	0	2.922	13 x 6 = 78	227.91	1.580	360.096
	D101-14Ø	0.15 ave = 1.046 0.32 max = 1.935 min = 0.158	0.15	14	1.516	0	1.516	25 x 6 = 150	227.40	1.210	275.154
	A101	ave = 2.835 max = 5.341 min = 0.328	0.15	12	2.835	0	2.835	17 x 10 = 170	481.879	0.888	427.909
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR OUTLET WING WALL		**1718.564**

Culvert @ STA. 973+718.458 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.565 °			13.420	5.738
TOE WALL (OUTLET)	A205	14.160	as	14	14.160	0	14.160	20 x 1 = 20	283.200	1.21	342.672
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	90 x 1 = 90	413.100	1.21	499.851
									TOTAL FOR OUTLET TOE WALL		**842.523**

Culvert @ STA. 973+718.458 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	4.088	as	14	4.088	0.00	4.088	2 x 1 = 2	8.175	1.21	9.892
	H202	0.25 0.29 0.539 0.378	0.15	14	1.456	0	1.456	25 x 1 = 25	36.412	1.21	44.058
	A100	4.749	as	12	4.749	0	4.749	6 x 2 = 12	56.982	0.888	50.600
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	25 x 2 = 50	90.674	1.21	109.716
	F300 G300	4.749	0.15	12	4.749	0	4.749	23 x 2 = 46	218.432	0.888	193.968
	L3 F301	ave = 1.983 x=0.15 max = 3.240 min = 0.726	0.15	14	2.133	0	2.133	12 x 2 = 24	51.195	1.21	61.946
	L3 G301	ave = 1.983 x=0.15 max = 3.240 min = 0.726	0.15	12	2.133	0	2.133	12 x 2 = 24	51.195	0.888	45.461
	L4 F301	3.560 x=0.15	0.15	14	3.860	0	3.860	19 x 1 = 19	73.340	1.21	88.741
	L4 G301	3.560 x=0.15	0.15	12	3.860	0	3.860	19 x 1 = 19	73.340	0.888	65.126
									TOTAL FOR OUTLET APRON		**669.508**

Culvert @ STA. 973+718.458 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	5.450	as	12	5.450	0	5.450	2 x 2 = 4	21.801	0.888	19.360
	B101-18Ø	0.15 ave = 2.466 0.38 max = 2.895 min = 2.036	0.15	18	2.996	0	2.996	13 x 2 = 26	77.88	2.000	155.769
	B101-14Ø	0.15 ave = 1.059 0.38 max = 1.961 min = 0.157	0.15	14	1.589	0	1.589	19 x 2 = 38	60.39	1.210	73.069
	C101	0.15 ave = 1.526 0.24 max = 2.895 min = 0.157	0.15	12	1.916	0	1.916	32 x 2 = 64	122.62	0.888	108.888
	A101	ave = 2.393 max = 4.458 min = 0.328	0.15	12	2.393	0	2.393	17 x 4 = 68	162.745	0.888	144.517
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
										TOTAL FOR OUTLET WING WALL	**621.550**

Culvert @ STA. 973+718.458 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.565 °			3.640	4.864

TOE WALL (OUTLET)	A205	4.088	as	14	4.088	0	4.088	20 x 1 = 20	81.753	1.21	98.921
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	28 x 1 = 28	132.808	1.21	160.698
										TOTAL FOR OUTLET TOE WALL	**259.619**

Culvert @ STA. 973+718.458 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		10.160	7.175

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	11.616	as	14	11.616	0.00	11.616	2 x 1 = 2	23.233	1.21	28.111
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	68 x 1 = 68	107.992	1.21	130.671
	A100	7.060	as	12	7.060	0	7.060	6 x 4 = 24	169.429	0.888	150.453
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	36 x 2 = 72	139.262	1.21	168.507
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	36 x 2 = 72	124.444	1.21	150.577
	F300 G300	7.060	0.15	12	7.060	0	7.060	61 x 2 = 122	861.263	0.888	764.801
	L3 F301	ave = 5.220 x=0.15 max = 9.674 min = 0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L3 G301	ave = 5.220 x=0.15 max = 9.674 min = 0.766	0.2	12	5.370	0	5.370	28 x 2 = 56	300.709	0.888	267.030
	L4 F301	10.080 x=0.15	0.2	12	10.380	0	10.380	8 x 1 = 8	83.040	0.888	73.740
	L4 G301	10.080 x=0.15	0.2	12	10.380	0	10.380	8 x 1 = 8	83.040	0.888	73.740
									TOTAL FOR OUTLET APRON		**2074.659**

Culvert @ STA. 973+718.458 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		10.160	7.175

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.533	as	12	7.533	0	7.533	2 x 4 = 8	60.262	0.888	53.513
	B101-18Ø	0.15 ave = 2.550 0.38 max = 2.903 min = 2.196	0.15	18	3.080	0	3.080	13 x 2 = 26	80.07	2.000	160.137
	B101-14Ø	0.15 ave = 1.141 0.38 max = 2.131 min = 0.151	0.15	14	1.671	0	1.671	35 x 2 = 70	116.96	1.210	141.524
	C101	0.15 ave = 1.527 0.24 max = 2.903 min = 0.151	0.15	12	1.917	0	1.917	48 x 2 = 96	184.04	0.888	163.427
	D101-16Ø	0.15 ave = 2.550 0.32 max = 2.903 min = 2.196	0.15	16	3.020	0	3.020	13 x 4 = 52	157.02	1.580	248.087
	D101-14Ø	0.15 ave = 1.141 0.32 max = 2.131 min = 0.151	0.15	14	1.611	0	1.611	35 x 4 = 140	225.52	1.210	272.885
	A101	ave = 3.551 max = 6.707 min = 0.395	0.15	12	3.551	0	3.551	17 x 8 = 136	482.942	0.888	428.853
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR OUTLET WING WALL		**1656.536**

Culvert @ STA. 973+718.458 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	23.413 °			10.160	7.175
TOE WALL (OUTLET)	A205	11.616	as	14	11.616	0	11.616	20 x 1 = 20	232.325	1.21	281.114
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	78 x 1 = 78	369.966	1.21	447.659
									TOTAL FOR OUTLET TOE WALL		**728.772**

Culvert @ STA. 973+718.458 skew 30 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	7.080	as	14	7.080	0.00	7.080	2 x 1 = 2	14.160	1.21	17.134
	H202	0.25 0.29 0.933 0.654	0.15	14	2.127	0	2.127	25 x 1 = 25	53.184	1.21	64.353
	A100	4.664	as	12	4.664	0	4.664	6 x 2 = 12	55.968	0.888	49.700
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	25 x 2 = 50	90.674	1.21	109.716
	F300 G300	4.664	0.15	12	4.664	0	4.664	23 x 2 = 46	214.544	0.888	190.515
	L3 F301	ave = 1.567 x=0.15 max = 2.693 min = 0.441	0.15	14	1.717	0	1.717	27 x 2 = 54	92.715	1.21	112.185
	L3 G301	ave = 1.567 x=0.15 max = 2.693 min = 0.441	0.15	12	1.717	0	1.717	27 x 2 = 54	92.715	0.888	82.331
	L4 F301	2.693	0.15	14	2.693	0	2.693	9 x 1 = 9	24.235	1.21	29.324
	L4 G301	2.693	0.15	12	2.693	0	2.693	9 x 1 = 9	24.235	0.888	21.521
									TOTAL FOR OUTLET APRON		676.778

Overlap

No Overlap

Culvert @ STA. 973+718.458 **skew** **30 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.56500°	1.31625°		3.640	4.864

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	5.450	as	12	5.450	0	5.450	2 x 2 = 4	21.801	0.888	19.360
	B101-18Ø	0.15 ave = 2.466 0.38 max = 2.895 min = 2.036	0.15	18	2.996	0	2.996	13 x 2 = 26	77.88	2.000	155.769
	B101-14Ø	0.15 ave = 1.059 0.38 max = 1.961 min = 0.157	0.15	14	1.589	0	1.589	19 x 2 = 38	60.39	1.210	73.069
	C101	0.15 ave = 1.526 0.24 max = 2.895 min = 0.157	0.15	12	1.916	0	1.916	32 x 2 = 64	122.62	0.888	108.888
	A101	ave = 2.393 max = 4.458 min = 0.328	0.15	12	2.393	0	2.393	17 x 4 = 68	162.745	0.888	144.517
	A300	0.679 0.06 0.240 0.5	0.15	12	1.479	0	1.479	19 x 2 = 38	56.195	0.888	49.901
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
									TOTAL FOR OUTLET WING WALL		**631.231**

Culvert @ STA. 973+718.458 **skew** **30 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.00	2.50	0.36	0.32	0.32	0.00	26.565 °			3.640	4.864
TOE WALL (OUTLET)	A205	7.080	as	14	7.080	0	7.080	20 x 1 = 20	141.600	1.21	171.336
	A204	0.300 1.340 1.800 0.340	0.15	14	5.580	0	5.580	48 x 1 = 48	267.840	1.21	324.086
									TOTAL FOR OUTLET TOE WALL		**495.422**

Culvert @ STA. 973+718.458 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		13.420	7.175

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	16.221	as	14	16.221	0.00	16.221	2 x 1 = 2	32.441	1.21	39.254
	H202	0.25 0.34 0.621 0.378	0.15	14	1.588	0	1.588	90 x 1 = 90	142.931	1.21	172.947
	A100	7.060	as	12	7.060	0	7.060	6 x 5 = 30	211.786	0.888	188.066
	F201	0.25 0.740 0.417 0.347	0.18 0.2	14	1.934	0	1.934	36 x 2 = 72	139.262	1.21	168.507
	F202	0.25 0.25 0.417 0.394 0.417	0.2	14	1.728	0	1.728	36 x 3 = 108	186.666	1.21	225.865
	F300 G300	7.060	0.15	12	7.060	0	7.060	80 x 2 = 160	1129.525	0.888	1003.018
	L3 F301	ave = 6.512 x=0.15 max = 12.228 min = 0.796	0.2	12	6.662	0	6.662	34 x 2 = 68	453.001	0.888	402.265
	L3 G301	ave = 6.512 x=0.15 max = 12.228 min = 0.796	0.2	12	6.662	0	6.662	34 x 2 = 68	453.001	0.888	402.265
	L4 F301	12.948	0.2	12	12.948	0	12.948	3 x 1 = 3	38.843	0.888	34.492
	L4 G301	12.948	0.2	12	12.948	0	12.948	3 x 1 = 3	38.843	0.888	34.492
									TOTAL FOR OUTLET APRON		2671.171

Overlap

No Overlap

Culvert @ STA. 973+718.458 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.41300°	2.29060°		13.420	7.175

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.533	as	12	7.533	0	7.533	2 x 5 = 10	75.328	0.888	66.891
	B101-18Ø	0.15 ave = 2.550 0.38 max = 2.903 min = 2.196	0.15	18	3.080	0	3.080	13 x 2 = 26	80.07	2.000	160.137
	B101-14Ø	0.15 ave = 1.141 0.38 max = 2.131 min = 0.151	0.15	14	1.671	0	1.671	35 x 2 = 70	116.96	1.210	141.524
	C101	0.15 ave = 1.527 0.24 max = 2.903 min = 0.151	0.15	12	1.917	0	1.917	48 x 2 = 96	184.04	0.888	163.427
	D101-16Ø	0.15 ave = 2.550 0.32 max = 2.903 min = 2.196	0.15	16	3.020	0	3.020	13 x 6 = 78	235.53	1.580	372.130
	D101-14Ø	0.15 ave = 1.141 0.32 max = 2.131 min = 0.151	0.15	14	1.611	0	1.611	35 x 6 = 210	338.31	1.210	409.355
	A101	ave = 3.551 max = 6.707 min = 0.395	0.15	12	3.551	0	3.551	17 x 10 = 170	603.678	0.888	536.066
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	19 x 2 = 38	45.293	0.888	40.220
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR OUTLET WING WALL		**2071.723**

Culvert @ STA. 973+718.458 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	23.413 °			13.420	7.175
TOE WALL (OUTLET)	A205	16.221	as	14	16.221	0	16.221	20 x 1 = 20	324.412	1.21	392.538
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	104 x 1 = 104	493.288	1.21	596.878
									TOTAL FOR OUTLET TOE WALL		**989.417**

Culvert @ STA. 973+718.458 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		4.140	6.960

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	4.040	as	14	4.040	0.00	4.040	2 x 1 = 2	8.080	1.21	9.777
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	28 x 1 = 28	37.343	1.21	45.185
	A100	6.860	as	12	6.860	0	6.860	6 x 2 = 12	82.320	0.888	73.100
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	35 x 2 = 70	126.944	1.21	153.602
	F300 G300	6.860	0.15	12	6.860	0	6.860	27 x 2 = 54	370.440	0.888	328.951
	L4 F301	4.060 x=0.15	0.15	16	4.360	0	4.360	47 x 1 = 47	204.920	1.58	323.774
	L4 G301	4.060 x=0.15	0.15	12	4.360	0	4.360	47 x 1 = 47	204.920	0.888	181.969
										TOTAL FOR OUTLET APRON	**1116.358**

Culvert @ STA. 973+718.458 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		4.140	6.960

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.536	as	12	7.536	0	7.536	2 x 2 = 4	30.146	0.888	26.769
	B101-20Ø	0.15 ave = 3.180 0.38 max = 3.395 min = 2.966	0.15	20	3.710	0	3.710	7 x 2 = 14	51.95	2.470	128.304
	B101-18Ø	0.15 ave = 2.461 0.38 max = 2.891 min = 2.032	0.15	18	2.991	0	2.991	12 x 2 = 24	71.79	2.000	143.586
	B101-14Ø	0.15 ave = 1.057 0.38 max = 1.957 min = 0.157	0.15	14	1.587	0	1.587	27 x 2 = 54	85.70	1.210	103.697
	C101	0.15 ave = 1.776 0.24 max = 3.395 min = 0.157	0.15	12	2.166	0	2.166	46 x 2 = 92	199.27	0.888	176.956
	A101	ave = 3.442 max = 6.555 min = 0.328	0.15	12	3.442	0	3.442	21 x 4 = 84	289.093	0.888	256.714
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	22 x 2 = 44	50.134	0.888	44.519
	B109	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B110	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B116	0.300 3.62	as	20	3.920	0	3.920	2 x 2 = 4	15.680	2.47	38.730
	C189	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	C190	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
									TOTAL FOR OUTLET WING WALL		**971.929**

Culvert @ STA. 973+718.458 **skew** **90 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.565 °			4.140	6.960
TOE WALL (OUTLET)	A205	4.040	as	14	4.040	0	4.040	20 x 1 = 20	80.800	1.21	97.768
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	28 x 1 = 28	128.520	1.21	155.509
									TOTAL FOR OUTLET TOE WALL		**253.277**

Culvert @ STA. 973+718.458 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		11.660	7.500

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	11.560	as	14	11.560	0.00	11.560	2 x 1 = 2	23.120	1.21	27.975
	H202	0.25 0.29 0.467 0.327	0.15	14	1.334	0	1.334	78 x 1 = 78	104.028	1.21	125.874
	A100	7.400	as	12	7.400	0	7.400	6 x 4 = 24	177.600	0.888	157.709
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	38 x 2 = 76	137.825	1.21	166.768
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	38 x 2 = 76	120.609	1.21	145.937
	F300 G300	7.400	0.15	12	7.400	0	7.400	73 x 2 = 146	1080.400	0.888	959.395
	L4 F301	11.580 x=0.15	0.15	14	11.880	0	11.880	50 x 1 = 50	594.000	1.21	718.740
	L4 G301	11.580 x=0.15	0.15	12	11.880	0	11.880	50 x 1 = 50	594.000	0.888	527.472
										TOTAL FOR OUTLET APRON	2829.870

Culvert @ STA. 973+718.458 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		11.660	7.500

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	8.026	as	12	8.026	0	8.026	2 x 4 = 8	64.211	0.888	57.019
	B101-20Ø	0.15 ave = 3.180 0.38 max = 3.395 min = 2.966	0.15	20	3.710	0	3.710	7 x 2 = 14	51.95	2.470	128.304
	B101-18Ø	0.15 ave = 2.461 0.38 max = 2.891 min = 2.032	0.15	18	2.991	0	2.991	12 x 2 = 24	71.79	2.000	143.586
	B101-14Ø	0.15 ave = 1.057 0.38 max = 1.957 min = 0.157	0.15	14	1.587	0	1.587	31 x 2 = 62	98.40	1.210	119.060
	C101	0.15 ave = 1.776 0.24 max = 3.395 min = 0.157	0.15	12	2.166	0	2.166	50 x 2 = 100	216.60	0.888	192.343
	D101-16Ø	0.15 ave = 2.751 0.32 max = 3.395 min = 2.107	0.15	16	3.221	0	3.221	19 x 4 = 76	244.80	1.580	386.782
	D101-14Ø	0.15 ave = 1.095 0.32 max = 2.032 min = 0.157	0.15	14	1.565	0	1.565	31 x 4 = 124	194.00	1.210	234.744
	A101	ave = 3.712 max = 7.095 min = 0.328	0.15	12	3.712	0	3.712	21 x 8 = 168	623.557	0.888	553.719
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	22 x 2 = 44	50.134	0.888	44.519
	B109	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B110	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B116	0.300 3.62	as	20	3.920	0	3.920	2 x 2 = 4	15.680	2.47	38.730
	C189	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	C190	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	D135	0.300 3.62	as	16	3.920	0	3.920	2 x 2 = 4	15.680	1.58	24.774
	D136	0.300 3.62	as	16	3.920	0	3.920	2 x 2 = 4	15.680	1.58	24.774
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	21 x 2 = 42	32.760	0.888	29.091
									TOTAL FOR OUTLET WING WALL		**2030.099**

Culvert @ STA. 973+718.458 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.565 °			11.660	7.500
TOE WALL (OUTLET)	A205	11.560	as	14	11.560	0	11.560	20 x 1 = 20	231.200	1.21	279.752
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	78 x 1 = 78	358.020	1.21	433.204
									TOTAL FOR OUTLET TOE WALL		**712.956**

Culvert @ STA. 973+718.458 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		4.140	6.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	4.665	as	14	4.665	0.00	4.665	2 x 1 = 2	9.330	1.21	11.289
	H202	0.25 0.29 0.539 0.378	0.15	14	1.456	0	1.456	28 x 1 = 28	40.781	1.21	49.345
	A100	5.885	as	12	5.885	0	5.885	6 x 2 = 12	70.614	0.888	62.706
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	31 x 2 = 62	112.436	1.21	136.047
	F300 G300	5.885	0.15	12	5.885	0	5.885	27 x 2 = 54	317.765	0.888	282.175
	L3 F301	ave = 2.233 x=0.15 max = 3.740 min = 0.726	0.15	16	2.383	0	2.383	14 x 2 = 28	66.727	1.58	105.429
	L3 G301	ave = 2.233 x=0.15 max = 3.740 min = 0.726	0.15	12	2.383	0	2.383	14 x 2 = 28	66.727	0.888	59.254
	L4 F301	4.060 x=0.15	0.15	16	4.360	0	4.360	25 x 1 = 25	109.000	1.58	172.220
	L4 G301	4.060 x=0.15	0.15	12	4.360	0	4.360	25 x 1 = 25	109.000	0.888	96.792
									TOTAL FOR OUTLET APRON		**975.257**

Culvert @ STA. 973+718.458 **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		4.140	6.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.684	as	12	6.684	0	6.684	2 x 2 = 4	26.738	0.888	23.743
	B101-20Ø	0.15 ave = 3.180 0.38 max = 3.395 min = 2.966	0.15	20	3.710	0	3.710	7 x 2 = 14	51.95	2.470	128.304
	B101-18Ø	0.15 ave = 2.461 0.38 max = 2.891 min = 2.032	0.15	18	2.991	0	2.991	12 x 2 = 24	71.79	2.000	143.586
	B101-14Ø	0.15 ave = 1.057 0.38 max = 1.957 min = 0.157	0.15	14	1.587	0	1.587	21 x 2 = 42	66.66	1.210	80.654
	C101	0.15 ave = 1.776 0.24 max = 3.395 min = 0.157	0.15	12	2.166	0	2.166	40 x 2 = 80	173.28	0.888	153.874
	A101	ave = 2.961 max = 5.595 min = 0.328	0.15	12	2.961	0	2.961	21 x 4 = 84	248.762	0.888	220.901
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	22 x 2 = 44	52.444	0.888	46.571
	B109	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B110	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B116	0.300 3.62	as	20	3.920	0	3.920	2 x 2 = 4	15.680	2.47	38.730
	C189	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	C190	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
									TOTAL FOR OUTLET WING WALL		**889.016**

Culvert @ STA. 973+718.458 **skew** **60 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.565 °			4.140	6.000

TOE WALL (OUTLET)	A205	4.665	as	14	4.665	0	4.665	20 x 1 = 20	93.300	1.21	112.893
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	32 x 1 = 32	151.781	1.21	183.655
									TOTAL FOR OUTLET TOE WALL		**296.547**

Culvert @ STA. 973+718.458 skew 60 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		11.660	7.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	14.188	as	14	14.188	0.00	14.188	2 x 1 = 2	28.377	1.21	34.336
	H202	0.25 0.29 0.530 0.378	0.15	14	1.456	0	1.456	78 x 1 = 78	113.605	1.21	137.462
	A100	6.885	as	12	6.885	0	6.885	6 x 4 = 24	165.229	0.888	146.723
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	36 x 2 = 72	130.571	1.21	157.991
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	36 x 2 = 72	114.261	1.21	138.256
	F300 G300	6.885	0.15	12	6.885	0	6.885	73 x 2 = 146	1005.141	0.888	892.566
	L3 F301	ave = 5.993 x=0.15 max = 11.260 min = 0.726	0.15	14	6.143	0	6.143	43 x 2 = 86	528.307	1.21	639.252
	L3 G301	ave = 5.993 x=0.15 max = 11.260 min = 0.726	0.15	12	6.143	0	6.143	43 x 2 = 86	528.307	0.888	469.137
	L4 F301	11.580 x=0.15	0.15	14	11.880	0	11.880	3 x 1 = 3	35.640	1.21	43.124
	L4 G301	11.580 x=0.15	0.15	12	11.880	0	11.880	3 x 1 = 3	35.640	0.888	31.648
										TOTAL FOR OUTLET APRON	2690.495

Culvert @ STA. 973+718.458 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		11.660	7.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.572	as	12	7.572	0	7.572	2 x 4 = 8	60.579	0.888	53.795
	B101-20Ø	0.15 ave = 3.180 0.38 max = 3.395 min = 2.966	0.15	20	3.710	0	3.710	7 x 2 = 14	51.95	2.470	128.304
	B101-18Ø	0.15 ave = 2.461 0.38 max = 2.891 min = 2.032	0.15	18	2.991	0	2.991	12 x 2 = 24	71.79	2.000	143.586
	B101-14Ø	0.15 ave = 1.057 0.38 max = 1.957 min = 0.157	0.15	14	1.587	0	1.587	28 x 2 = 56	88.87	1.210	107.538
	C101	0.15 ave = 1.776 0.24 max = 3.395 min = 0.157	0.15	12	2.166	0	2.166	47 x 2 = 94	203.61	0.888	180.802
	D101-16Ø	0.15 ave = 2.751 0.32 max = 3.395 min = 2.107	0.15	16	3.221	0	3.221	19 x 4 = 76	244.80	1.580	386.782
	D101-14Ø	0.15 ave = 1.095 0.32 max = 2.032 min = 0.157	0.15	14	1.565	0	1.565	28 x 4 = 112	175.23	1.210	212.027
	A101	ave = 3.462 max = 6.595 min = 0.328	0.15	12	3.462	0	3.462	21 x 8 = 168	581.546	0.888	516.413
	A300	0.392 0.06 0.240 0.5	0.15	12	1.192	0	1.192	22 x 2 = 44	52.444	0.888	46.571
	B109	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B110	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B116	0.300 3.62	as	20	3.920	0	3.920	2 x 2 = 4	15.680	2.47	38.730
	C189	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	C190	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	D135	0.300 3.62	as	16	3.920	0	3.920	2 x 2 = 4	15.680	1.58	24.774
	D136	0.300 3.62	as	16	3.920	0	3.920	2 x 2 = 4	15.680	1.58	24.774
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	21 x 2 = 42	32.760	0.888	29.091
									TOTAL FOR OUTLET WING WALL		**1945.841**

Culvert @ STA. 973+718.458 **skew** **60** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.565 °			11.660	7.000
TOE WALL (OUTLET)	A205	14.188	as	14	14.188	0	14.188	20 x 1 = 20	283.766	1.21	343.357
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	90 x 1 = 90	426.884	1.21	516.529
									TOTAL FOR OUTLET TOE WALL		**859.887**

Culvert @ STA. 973+718.458 skew 30 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		4.140	6.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	8.080	as	14	8.080	0.00	8.080	2 x 1 = 2	16.160	1.21	19.554
	H202	0.25 0.29 0.933 0.654	0.15	14	2.127	0	2.127	28 x 1 = 28	59.567	1.21	72.076
	A100	5.800	as	12	5.800	0	5.800	6 x 2 = 12	69.600	0.888	61.805
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	31 x 2 = 62	112.436	1.21	136.047
	F300 G300	5.800	0.15	12	5.800	0	5.800	27 x 2 = 54	313.200	0.888	278.122
	L3 F301	ave = 1.920 x=0.15 max = 3.349 min = 0.491	0.15	16	2.070	0	2.070	34 x 2 = 68	140.740	1.58	222.369
	L3 G301	ave = 1.920 x=0.15 max = 3.349 min = 0.491	0.15	12	2.070	0	2.070	34 x 2 = 68	140.740	0.888	124.977
	L4 F301	3.349	0.15	16	3.349	0	3.349	47 x 1 = 47	157.386	1.58	248.670
	L4 G301	3.349	0.15	12	3.349	0	3.349	47 x 1 = 47	157.386	0.888	139.759
									TOTAL FOR OUTLET APRON		1303.379

Overlap

No Overlap

Culvert @ STA. 973+718.458 **skew** **30 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.56500°	1.31625°		4.140	6.000

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.684	as	12	6.684	0	6.684	2 x 2 = 4	26.738	0.888	23.743
	B101-20Ø	0.15 ave = 3.180 0.38 max = 3.395 min = 2.966	0.15	20	3.710	0	3.710	7 x 2 = 14	51.95	2.470	128.304
	B101-18Ø	0.15 ave = 2.461 0.38 max = 2.891 min = 2.032	0.15	18	2.991	0	2.991	12 x 2 = 24	71.79	2.000	143.586
	B101-14Ø	0.15 ave = 1.057 0.38 max = 1.957 min = 0.157	0.15	14	1.587	0	1.587	21 x 2 = 42	66.66	1.210	80.654
	C101	0.15 ave = 1.776 0.24 max = 3.395 min = 0.157	0.15	12	2.166	0	2.166	40 x 2 = 80	173.28	0.888	153.874
	A101	ave = 2.961 max = 5.595 min = 0.328	0.15	12	2.961	0	2.961	21 x 4 = 84	248.762	0.888	220.901
	A300	0.679 0.06 0.240 0.5	0.15	12	1.479	0	1.479	22 x 2 = 44	65.068	0.888	57.780
	B109	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B110	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B116	0.300 3.62	as	20	3.920	0	3.920	2 x 2 = 4	15.680	2.47	38.730
	C189	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	C190	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
									TOTAL FOR OUTLET WING WALL		**900.226**

Culvert @ STA. 973+718.458 **skew** **30 °**

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	3.50	3.00	0.36	0.32	0.32	0.00	26.565 °			4.140	6.000
TOE WALL (OUTLET)	A205	8.080	as	14	8.080	0	8.080	20 x 1 = 20	161.600	1.21	195.536
	A204	0.300 1.340 1.800 0.340	0.15	14	5.580	0	5.580	55 x 1 = 55	306.900	1.21	371.349
									TOTAL FOR OUTLET TOE WALL		**566.884**

Culvert @ STA. 973+718.458 skew 30 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		11.660	6.708

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	23.960	as	14	23.960	0.00	23.960	2 x 1 = 2	47.920	1.21	57.983
	H202	0.25 0.29 0.933 0.654	0.15	14	2.127	0	2.127	78 x 1 = 78	165.935	1.21	200.782
	A100	6.508	as	12	6.508	0	6.508	6 x 4 = 24	156.192	0.888	138.699
	F201	0.25 0.740 0.346 0.347	0.13 0.2	14	1.813	0	1.813	34 x 2 = 68	123.317	1.21	149.213
	F202	0.25 0.25 0.346 0.394 0.346	0.2	14	1.587	0	1.587	34 x 2 = 68	107.914	1.21	130.575
	F300 G300	6.508	0.15	12	6.508	0	6.508	73 x 2 = 146	950.168	0.888	843.749
	L3 F301	ave = 2.112 x=0.15 max = 3.757 min = 0.467	0.15	14	2.262	0	2.262	39 x 2 = 78	176.433	1.21	213.484
	L3 G301	ave = 2.112 x=0.15 max = 3.757 min = 0.467	0.15	12	2.262	0	2.262	39 x 2 = 78	176.433	0.888	156.673
	L4 F301	3.757	0.15	14	3.757	0	3.757	90 x 1 = 90	338.167	1.21	409.182
	L4 G301	3.757	0.15	12	3.757	0	3.757	90 x 1 = 90	338.167	0.888	300.292
									TOTAL FOR OUTLET APRON		2600.632

Overlap

No Overlap

Culvert @ STA. 973+718.458 **skew** **30** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.56500°	1.31625°		11.660	6.708

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	7.310	as	12	7.310	0	7.310	2 x 4 = 8	58.481	0.888	51.931
	B101-20Ø	0.15 ave = 3.180 0.38 max = 3.395 min = 2.966	0.15	20	3.710	0	3.710	7 x 2 = 14	51.95	2.470	128.304
	B101-18Ø	0.15 ave = 2.461 0.38 max = 2.891 min = 2.032	0.15	18	2.991	0	2.991	12 x 2 = 24	71.79	2.000	143.586
	B101-14Ø	0.15 ave = 1.057 0.38 max = 1.957 min = 0.157	0.15	14	1.587	0	1.587	26 x 2 = 52	82.53	1.210	99.857
	C101	0.15 ave = 1.776 0.24 max = 3.395 min = 0.157	0.15	12	2.166	0	2.166	45 x 2 = 90	194.94	0.888	173.109
	D101-16Ø	0.15 ave = 2.751 0.32 max = 3.395 min = 2.107	0.15	16	3.221	0	3.221	19 x 4 = 76	244.80	1.580	386.782
	D101-14Ø	0.15 ave = 1.095 0.32 max = 2.032 min = 0.157	0.15	14	1.565	0	1.565	26 x 4 = 104	162.71	1.210	196.882
	A101	ave = 3.316 max = 6.303 min = 0.328	0.15	12	3.316	0	3.316	21 x 8 = 168	557.012	0.888	494.626
	A300	0.679 0.06 0.240 0.5	0.15	12	1.479	0	1.479	22 x 2 = 44	65.068	0.888	57.780
	B109	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B110	0.300 3.62	as	20	3.920	0	3.920	1 x 2 = 2	7.840	2.47	19.365
	B116	0.300 3.62	as	20	3.920	0	3.920	2 x 2 = 4	15.680	2.47	38.730
	C189	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	C190	0.300 3.62	as	12	3.920	0	3.920	1 x 2 = 2	7.840	0.888	6.962
	D135	0.300 3.62	as	16	3.920	0	3.920	2 x 2 = 4	15.680	1.58	24.774
	D136	0.300 3.62	as	16	3.920	0	3.920	2 x 2 = 4	15.680	1.58	24.774
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	21 x 2 = 42	32.760	0.888	29.091
									TOTAL FOR OUTLET WING WALL		**1902.881**

Culvert @ STA. 973+718.458 **skew** **30** °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.50	3.00	0.36	0.32	0.32	0.26	26.565 °			11.660	6.708
TOE WALL (OUTLET)	A205	23.960	as	14	23.960	0	23.960	20 x 1 = 20	479.199	1.21	579.831
	A204	0.300 1.340 1.800 0.340	0.15	14	5.580	0	5.580	155 x 1 = 155	864.899	1.21	1046.528
									TOTAL FOR OUTLET TOE WALL		**1626.359**

Station **52+242.000**

RCBC **1 - 1.50 x 1.00**

R. C. B. C.

T1 = 0.26 W1 = 0.22
T2 = 0.22 W2 = 0.00
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 1566.905
B.C. slope = 0.00754

Skew = 90 ° Normal
P.G.L. = 1569.243
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station	52+242.000		skew	90°	Normal		TABLE 1				
	S	H	T1	T2	W1	W2			BARREL LENGTH (L)		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1		TOTAL
1	1.50	1.00	0.26	0.22	0.22	0.00	0.50	1.94	20.000		20.000

width of culvert = X = S+2W1

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	A	0.48 0.705	0.3H+T1-0.08 0.4 0.35S+W1-0.04	14 If table 3 & span=3.0 then Ø=16, if span=3.5 then Ø=20 If table4 & span>=3.0 then Ø=20,if span>=2.0 then Ø=16 but if none of the above then Ø=14	1.185	0.00	1.19	51 x 4 = 204	(L - 0.08)/0.4 + 1 241.740	1.21 If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55	292.505
	B	1.86 x=0.25 If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60	S+2W1-0.08 0.4	14	constant 2.36	0	2.36	51 x 2 = 102	(L - 0.08)/0.4 + 1 240.720	1.21	291.271 constant
	D	1.86	S+2W1-0.08 0.14	16 If table 1 Ø=16;if table 3 & span>=1.50 Ø=16;>=2.5 Ø=20;=3.5 Ø=24 If table 4 & span=1.5 Ø=16;>=2.0 Ø=20;>=3.0 Ø=24 If none of the above Ø=14	1.86	0	1.86	143 x 2 = 286	(L - 0.08)/0.14 + 1 531.960	1.58 If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55	840.497
	F	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60 x=0.25 1.36	0.4 H+T1+T2-0.12	14	1.86 constant	0	1.86	51 x 2 = 102	(L - 0.08)/0.4 + 1 189.720	1.21	229.561 constant
	G	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60 x=0.25 1.36	0.44 H+T1+T2-0.12	14	1.61 constant	0	1.61	46 x 2 = 92	(L - 0.08)/0.44 + 1 148.120	1.21	179.225 constant
	LONG'NAL 20.000	12 8.740 I.L.=60xØ	L-0.10+Overlap VAR.	14	20.740 constant	0	20.740	11+14+7*2 39	808.860	1.21	978.721 constant
										SUB-TOTAL =	2811.780

Station 52+242.000 **skew 90 ₀ Normal**

							TABLE 1		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL			X	P2		TOTAL
1	1.50	1.00	0.26	0.22	0.22			1.94	15.026		15.026

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 15.026 m	A	0.43 / 0.71	0.3H+T1-0.08 / 0.4 / 0.35S+W1-0.04	14	1.185	0.00	1.19	38 x 4 = 152	(L - 0.08)/0.4 + 1 180.120	1.21	217.945
				If table 3 & span=3.0 then Ø=16, if span=3.5 then Ø=20 If table4 & span>=3.0 then Ø=20,if span>=2.0 then Ø=16 but if none of the above then Ø=14						If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55	
	B	1.86 / x=0.25	S+2W1-0.08 / 0.4	14	constant 2.36	0	2.36	38 x 2 = 76	(L - 0.08)/0.4 + 1 179.360	1.21	217.026 constant
		If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60									
	D	1.86	S+2W1-0.08 / 0.14	16	1.86	0	1.86	108 x 2 = 216	(L - 0.08)/0.14 + 1 401.760	1.58	634.781
				If table 1 Ø=16;if table 3 & span>=1.50 Ø=16;>=2.5 Ø=20;=3.5 Ø=24 If table 4 & span=1.5 Ø=16;>=2.0 Ø=20;>=3.0 Ø=24 If none of the above Ø=14						If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55	
		If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60									
	F	x=0.25 / 1.36	0.4 / H+T1+T2-0.12	14	1.86 constant	0	1.86	38 x 2 = 76	(L - 0.08)/0.4 + 1 141.360	1.21	171.046 constant
		If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60									
	G	x=0.25 / 1.36	0.44 / H+T1+T2-0.12	14	1.61 constant	0	1.61	35 x 2 = 70	(L - 0.08)/0.44 + 1 112.700	1.21	136.367 constant
	LONG'NAL 15.026	12 / 3.766 / D.I.= 60 x Ø	L-0.10+Overlap / VAR.	14	15.766 constant	0	15.766	11+14+7*2 39	614.874	1.21	743.998 constant
										SUB TOTAL =	2121.162

Station 52+242.000 skew 90° Normal

TABLE 1

CELL NO.	SPAN S	HEIGHT H	BOT.SLAB T1	TOP SLAB T2	EXT.WALL W1	INT.WALL W2	EDGE BEAM WC	EDGE BEAM BB	BARREL DIMENSION	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.20	0.55		1.940 S+2W1	1.940

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.313 0.14	(BB-0.08)*2/3 0.3 T2-0.08	12	1.107	0	1.107	7 x 4 = 28	(X - 0.08)/0.30 + 1 30.987	0.888	27.516
EDGE BEAM	E101	1.860	- Xs - 0.08	18	1.860	0	1.860	10 x 2 = 20	as per table 37.20	2.00	74.400
EDGE BEAM	E102	1.860	-	14	1.860	0	1.860	2 x 2 = 4	as per table 7.44	1.21	9.002
EDGE BEAM	WC - 0.08 E103 T2 - 0.08	0.120 0.24 0.14 0.15	T2+0.10-0.08 0.2 constant	12	0.800	0	0.800	10 x 2 = 20	(X - 0.08)/0.20 + 1 16.00	0.89	14.208
END BARREL KEY	H301	1.860	Xs - 0.08 -	24	1.860	0	1.860	4 x 2 = 8	as per table 14.880	3.55	52.824
END BARREL KEY	H302 T1+0.10-0.08	0.320 0.396 0.28 0.320	0.40-0.08 0.15 sqrt(0.28^2*2) 0.40-0.08	14	1.316	0	1.316	13 x 2 = 26	(X - 0.08)/0.15 + 1 34.215	1.21	41.401
END BARREL KEY	H300 *WALL*	0.800	constant 0.3	16	0.800	0	0.800	4 x 4 = 16	(X - 0.06)/0.30 + 1 12.80	1.58	20.224
END BARREL KEY	H300 *BOT.SLAB*	0.800	constant 0.15	16	0.800	0	0.800	13 x 2 = 26	(X - 0.08)/0.15 + 1 20.80	1.58	32.864
END BARREL KEY	WALL *EXP. JT.*	0.800	constant 0.3	16	0.800	0	0.800	4 x 2 = 8	(X - 0.06)/0.30 + 1 6.40	1.58	10.112
END BARREL KEY	Top & Bot. *EXP. JT.*	0.800	constant 0.15	16	0.800	0	0.800	26 x 1 = 26	(X - 0.08)/0.30 + 1 20.80	1.58	32.864
										SUB TOTAL =	**315.415**

Station 52+242.000 skew 90 INLET

CELL NO.	S SPAN	H HEIGHT	T1 BOT.SLAB	T2 TOP SLAB	W1 EXT.WALL	TABLE 1 IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.5650°	0.43206°	S+2W1	1.940	2.404

0.15 — If S=1.00, 0.05;1.50,0.15;2.00,0.10;2.50,0.05;3.00,0.15;3.50,0.10

Side Slope angle — 0.10 — If Side Slope angle is > 21.8°=0.10 & if less=0.20

-1.0 — Culvert Slope angle — If structure is Inlet= -1.0 & if Outlet=1.0

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	1.860	X1-0.08 as	14	1.860	0.00	1.860	2 x 1 = 2	as per table 3.720	1.21	4.501
	constant H202 Sqrt(0.24^2*2	0.25 0.24 0.339 0.327	T1+0.10-0.08-0.04 0.15 0.40-0.073	14	1.156	0	1.156	13 x 1 = 13	(X1-0.08)/0.15 + 1 15.033	1.21	18.190
	A100	2.304	L1 - 0.10 as	12	2.304	0	2.304	6 x 2 = 12	as per table 27.648	0.89	24.551
	constant F201 Sqrt(0.235^2*2	Sqrt(W1+0.28-0.08)^2*2) 0.25 0.552 0.262 0.247	0.23 0.2 T1+0.10-0.04-0.033	.25+0.10-0.12 14	1.540	0	1.540	13 x 2 = 26	(L1-0.08)/0.20 + 1 40.044	1.21	48.454
	F300 G300	2.304	L1 - 0.10 0.15	12	2.304	0	2.304	13 x 2 = 26	(S - 0.15*2)/0.15 + 1 + 4 59.904	0.89	53.195
	L4 F301	1.860 x=0.15	X1-0.08 0.2 constant	12	2.160	0	2.160	13 x 1 = 13	(L1-0.08)/0.15 + 1 28.080	0.89	24.935
	L4 G301	1.860 x=0.15	X1-0.08 0.2 constant	12	2.160	0	2.160	13 x 1 = 13	(L1-0.08)/0.15 + 1 28.080	0.89	24.935
									TOTAL FOR INLET APRON		**198.762**

Station 52+242.000 skew 90 °

	S	H	T1	T2	W1	TABLE 1				BARREL WIDTH	APRON LENGTH
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		X1	L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.56499°	-0.43206°	S+2W1	1.940	2.404
						Side Slope angle	0.5000	-0.008	Culvert Slope angle		
						Side Slope		If structure is Inlet=neg. sign & if Outlet=pos. sign			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	sqrt((L1-0.17)^2+(H+T2-0.05)^2) 2.522	as	12	2.522	0	2.522	2 x 2 = 4	constant 10.087	0.89	8.958
	B101	0.15 ave =0.727 0.28 max =1.294 min =0.160	constant 0.15 W1+0.10-0.04 (H+T2+0.17)/cos(culv. slope)-0.05/cos(side slope)-0.08*tan(side slope) 0.17+0.09*tan(culv. slope)-0.05/cos(side slope)-0.09*tan(culv. Slope)	14	1.157	0	1.157	16 x 2 = 32	(L1-0.17)/0.15+1 37.02	1.21	44.797
	C101	0.15 ave =0.727 0.14 max =1.294 min =0.160	constant 0.15 W1-0.08 (H+T2+0.17)/cos(culv. slope)-0.05/cos(side slope)-0.08*tan(side slope) 0.17+0.09*tan(culv. slope)-0.05/cos(side slope)-0.09*tan(culv. Slope)	12	1.017	0	1.017	16 x 2 = 32	(L1-0.17)/0.15+1 32.54	0.89	28.898
	A101	ide slope angle is >21.8, 0.26 ; if less = 0.11 0.26 ave =1.173 max =2.017 min =0.328	0.15 (L1-0.08/cos(culv.slope)-0.10/(0.50 - -0.008)-0.05/sin(side slope) 0.26/tan(side slope)-0.08-0.05/sin(side slope)	12	1.173	0	1.173	7 x 4 = 28	(H+T2-0.10-0.26)/0.15+1 32.831	0.89	29.154
	A300	sqrt(0.14^2*2 0.198 0.06 0.140 constant 0.5	constant 0.15 W1-0.08	12	0.898	0	0.898	8 x 2 = 16	(H+T2-0.11)/0.15+1 14.368	0.89	12.759
	B109	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	20	1.720	0	1.720	1 x 2 = 2	constant 3.440	2.47	8.497
	B110	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	20	1.720	0	1.720	1 x 2 = 2	constant 3.440	2.47	8.497
	B116	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	20	1.720	0	1.720	2 x 2 = 4	constant 6.880	2.47	16.994
	C189	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	12	1.720	0	1.720	1 x 2 = 2	constant 3.440	0.89	3.055
	C190	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	12	1.720	0	1.720	1 x 2 = 2	constant 3.440	0.89	3.055
									TOTAL FOR INLET WING WALL		**164.662**

Station 52+242.000 skew 90 °

						TABLE 1				BARREL WIDTH	APRON LENGTH
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			X1	L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.565 °			1.940	2.404
TOE WALL (INLET)	A205	1.860	X1 - 0.08 as	14	1.860	0	1.860	10 x 1 = 10	If inlet=10 but if outlet=20 18.600	1.21	22.506
	A203	0.150 0.670 0.800 (0.25-0.08) 0.170	constant 0.25+0.5-0.08 0.15 If inlet=0.80 but if outlet=1.80	14	2.590	0	2.590	13 x 1 = 13	(L1-0.08)/0.15+1 33.670	1.21	40.741
									TOTAL FOR INLET TOE WALL		**63.247**

Station 52+242.000 skew 90 OUTLET → Same as in inlet formula

TABLE 1

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.5650°	0.43206°		1.940	2.477
	0.15						0.10	1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	1.860	as	14	1.860	0.00	1.860	2 x 1 = 2	3.720	1.21	4.501
	H202	0.25 0.24 0.339 0.327	0.15	14	1.156	0	1.156	13 x 1 = 13	15.033	1.21	18.190
	A100	2.377	as	12	2.377	0	2.377	6 x 2 = 12	28.524	0.89	25.329
	F201	0.25 0.552 0.276 0.247	0.23 0.2	14	1.554	0	1.554	13 x 2 = 26	40.412	1.21	48.899
	F300 G300	2.377	0.15	12	2.377	0	2.377	13 x 2 = 26	61.802	0.89	54.880
	L4 F301	1.860 x=0.15	0.2	12	2.160	0	2.160	13 x 1 = 13	28.080	0.89	24.935
	L4 G301	1.860 x=0.15	0.2	12	2.160	0	2.160	13 x 1 = 13	28.080	0.89	24.935
									TOTAL FOR OUTLET APRON		**201.670**

Station 52+242.000 skew 90 °

							TABLE 1			BARREL WIDTH	APRON LENGTH
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		X1	L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.56499°	0.43206°		1.940	2.477
							0.5000	0.008			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	2.587	as	12	2.587	0	2.587	2 x 2 = 4	10.347	0.89	9.188
	B101	0.15 ave =0.726 0.28 max =1.294 min =0.158	0.15	14	1.156	0	1.156	16 x 2 = 32	37.00	1.21	44.771
	C101	0.15 ave =0.726 0.14 max =1.294 min =0.158	0.15	12	1.016	0	1.016	16 x 2 = 32	32.52	0.89	28.879
	A101	ave =1.204 max =2.080 0.26 min =0.328	0.15	12	1.204	0	1.204	7 x 4 = 28	33.722	0.89	29.945
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.89	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.89	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.89	3.055
									TOTAL FOR OUTLET WING WALL		**165.638**

Station 52+242.000 skew 90 °

							TABLE 1			BARREL WIDTH	APRON LENGTH
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			X1	L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.565 °			1.940	2.477
TOE WALL (OUTLET)	A205	1.860	as	14	1.860	0	1.860	20 x 1 = 20	37.200	1.21	45.012
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	13 x 1 = 13	59.670	1.21	72.201
									TOTAL FOR OUTLET TOE WALL		**117.213**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 52+242.000 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.20	0.55	35.026	1.940	1.940

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	27.516	472.177
E103		14.208	
W.W.		430.453	
A	14	510.451	3,920.831
B		508.297	
F		400.607	
G		315.592	
LONG'L		1,722.718	
E102		9.002	
H302		41.401	
W.W.		412.764	
D	16	1,475.278	1,571.342
H300		53.088	
E.J		42.976	
E101	18	74.400	74.400
W.W.	20	67.974	67.974
	22	0.000	0.000
H301	24	52.824	52.824
	25	0.000	0.000
		TOTAL WEIGHT =	**6,159.548**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 52+242.000 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.200	0.55	35.026	1.940	1.940

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	14.949
BOTTOM SLAB	Vol. = Length * X * T1	17.667
OUTER WALLS	Vol. = Length * H * 2W1	15.411
INNER WALLS	Vol. = Length * H * W2	0.000
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.039
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.175
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2	0.088
	TOTAL VOLUME =	**48.329**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 52+242.000 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	2.404	2.477	0.250	1.940	1.940

X2	SLOPE
0.2	2.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	1.166
APRON OUTLET	Vol. = Lo * X * T	1.201
TOE WALL INLET	Vol. = XS * T * (1-T)	0.364
TOE WALL OUTLET	Vol. = XS * T * (2-T)	0.849
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.585
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.602
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.000
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.000
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.164
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.171
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.000
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.000
END KEY BLOCKS OUTER (INLET & OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)*2	0.194
	TOTAL VOLUME =	**5.296**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station 37 + 452.180

R. C. B. C.

RCBC	**1**	**1.50 x**	**1.00**
T1 =	0.26	W1 =	0.22
T2 =	0.22	W2 =	0.00
SSL =	2.000 =	2.3094	
SSR =	2.000 =	2.3094	

Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L. ELEV.= 2032.567
CULV. SLP = 0.04000

Skew = 60 ° Right
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

t =	0.630	xleft =	3.316 (0.63/(0.25-0.06)
skew =	60	yleft =	0.829 (3.316*0.06+0.63)
slope =	0.25	xright =	2.032 (0.63/(0.25+0.06)
rd. width =	14.300	yright =	0.508 (2.032*0.06+0.63)
half med=	2.000		

Station 37+452.180

		PGL	S.E.							
1	37462.350	2036.42	0.06	a	17.616	b	10.170	c	20.341
2	37+460.436	2036.327	0.06	a	14.300 rd. width	b	8.256	c	16.512
3	37+453.335	2035.766		a	2.000 half med.	b	1.155	c	2.309
4	37+452.180	2035.674		a		b		c	
5	37+451.025	2035.583		a	2.000 half med.	b	1.155	c	2.309
6	37+443.924	2035.02	0.06	a	14.300 rd. width	b	8.256	c	16.512
7	37+442.751	2034.869	0.06	a	16.332	b	9.429	c	18.859

Station **37 + 452.180** **skew** **60°** **Right**

	S	H	T1	T2	W1	W2	TABLE 2		BARREL LENGTH (L)		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1		TOTAL
1	1.50	1.00	0.26	0.22	0.22	0.00	0.43	1.94	20.000		20.000

width of culvert = X = S+2W1

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	A	0.48 0.71	0.3H+T1-0.08 0.44 0.35S+W1-0.04	14	1.185	0.00	1.19	46 x 4 = 184	(L - 0.08)/0.44 + 1 218.040	1.21	263.828
				If table 3 & span=3.0 then Ø=16, if span=3.5 then Ø=20 If table4 & span>=3.0 then Ø=20,if span>=2.0 then Ø=16 but if none of the above then Ø=14						If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55	
	B	1.86 x=0.25	S+2W1-0.08 0.44	14	constant 2.36	0	2.36	46 x 2 = 92	(L - 0.08)/0.44 + 1 217.120	1.21	262.715
	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60										constant
	D	1.86	S+2W1-0.08 0.36	14	1.86	0	1.86	56 x 2 = 112	(L - 0.08)/0.36 + 1 208.320	1.21	252.067
				If table 1 Ø=16;if table 3 & span>=1.50 Ø=16;>=2.5 Ø=20;=3.5 Ø=24 If table 4 & span=1.5 Ø=16;>=2.0 Ø=20;>=3.0 Ø=24 If none of the above Ø=14						If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55	
	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60										
	F	x=0.25 1.36	0.44 H+T1+T2-0.12	14	1.86 constant	0	1.86	46 x 2 = 92	(L - 0.08)/0.44 + 1 171.120	1.21	207.055 constant
	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60										
	G	x=0.25 1.36	0.44 H+T1+T2-0.12	14	1.61 constant	0	1.61	46 x 2 = 92	(L - 0.08)/0.44 + 1 148.120	1.21	179.225 constant
	LONG'NAL 20.000	12 8.740 O.I.= 60 x Ø	L-0.10+Overlap VAR.	14	20.740 constant	0	20.740	11+11+7*2 36	746.640	1.21	903.434 constant
										SUB TOTAL =	**2068.326**

Station 37 + 452.180 skew 60 ° Right

	S	H	T1	T2	W1	TABLE 2			BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL			X	P2=P3		TOTAL
1	1.50	1.00	0.26	0.22	0.22			1.94	11.687		11.687

width of culvert = X = S+2W1

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2=P3 11.687 m.	A	0.48 0.71	0.3H+T1-0.08 0.44 0.35S+W1-0.04	14	1.185	0.00	1.19	27 x 8 = 216	(L - 0.08)/0.44 + 1 255.960	1.21	309.712
										If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55	
	B	1.86 x=0.25	S+2W1-0.08 0.44	14	constant 2.36	0	2.36	27 x 4 = 108	(L - 0.08)/0.44 + 1 254.880	1.21	308.405
		If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60									constant
	D	1.86	S+2W1-0.08 0.36	14	1.86	0	1.86	33 x 4 = 132	(L - 0.08)/0.36 + 1 245.520	1.21	297.079
				If table 1 Ø=16;if table 3 & span>=1.50 Ø=16;>=2.5 Ø=20;=3.5 Ø=24 If table 4 & span=1.5 Ø=16;>=2.0 Ø=20;>=3.0 Ø=24 If none of the above Ø=14					If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55		
	F	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60 x=0.25 1.36	0.44 H+T1+T2-0.12	14	1.86 constant	0	1.86	27 x 4 = 108	(L - 0.08)/0.44 + 1 200.880	1.21	243.065 constant
	G	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60 x=0.25 1.36	0.44 H+T1+T2-0.12	14	1.61 constant	0	1.61	27 x 4 = 108	(L - 0.08)/0.44 + 1 173.880	1.21	210.395 constant
	P2 to P5 LONG'NAL 12.807	12.692	L-0.10+Overlap VAR.	14	12.692 constant	0	12.692	11+11+7*2 72	913.793	1.21	1105.689 constant
										SUB TOTAL =	2474.344

Station 37 + 452.180 skew 60 ° Right

	S	H	T1	T2	W1	TABLE 2			BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL			X	P4=P5		TOTAL
1	1.50	1.00	0.26	0.22	0.22			1.94	1.120		1.120

width of culvert = X = S+2W1

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 3 - 3 P4=P5 1.120 m.	A	0.48 0.705	0.3H+T1-0.08 0.44 0.35S+W1-0.04	14	1.185	0.00	1.19	1 x 4 = 4	(L - (W1+0.35*S)*2/tan60 4.740	1.21	5.735
				If table 3 & span=3.0 then Ø=16, if span=3.5 then Ø=20 If table4 & span>=3.0 then Ø=20,if span>=2.0 then Ø=16 but if none of the above then Ø=14					If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55		
	A	(L-spacing*(A no.of pieces+1))*tan60-0.04-0.05/cos60 0.276	0.44	14	0.276	0.00	0.28	1 x 4 = 4	(L - spcng*(A no of pieces+1)/spcng 1.103	1.21	1.335
				If table 3 & span=3.0 then Ø=16, if span=3.5 then Ø=20 If table4 & span>=3.0 then Ø=20,if span>=2.0 then Ø=16 but if none of the above then Ø=14					If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55		
	B	max + min) / 2 0.657 x=0.25 max=1.038 min=0.276	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60 0.44 2W1+S-0.04-spcng*tan60-0.05/cos60 (L-spacing*(no.of pieces))*tan60-0.04-0.05/cos60	14	0.907	0	0.907	2 x 4 = 8	(L - spcng) / spcng 7.255	1.21	8.778 constant
	D	(max + min) / 2 0.865 max=1.176 min=0.553	0.36 2W1+S-0.04-spcng*tan60-0.05/cos60 (L-spacing*(no.of pieces-1))*tan60-0.04-0.05/cos60	14	0.865	0	0.865	3 x 4 = 12	(L /0.44) 10.376	1.21	12.555
				If table 1 Ø=16;if table 3 & span>=1.50 Ø=16;>=2.5 Ø=20;=3.5 Ø=24 If table 4 & span=1.5 Ø=16;>=2.0 Ø=20;>=3.0 Ø=24 If none of the above Ø=14					If Ø=12,0.888,Ø=14,1.21,Ø=16,1.58,Ø=18,2.00, Ø=20,2.47,Ø=22,2.98,Ø=24,3.55		
	F	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60 x=0.25 1.36	0.44 H+T1+T2-0.12	14	1.86 constant	0	1.86	3 x 2 = 6	(L - spcng) / spcng +1 11.160	1.21	13.504 constant
	G	If bar Ø=14,X=0.25; 16=0.30; 20=0.35; 24=40; 32=0.60 x=0.25 1.36	0.44 H+T1+T2-0.12	14	1.61 constant	0	1.61	3 x 2 = 6	(L - spcng) / spcng +1 9.660	1.21	11.689 constant
										SUB TOTAL =	53.596

Station 37 + 452.180 skew 60° Right

TABLE 2

CELL	S	H	T1	T2	W1						
	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	B	D	TBS	TTS	TOW	TIN	WC	TL		X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.231	0.600		1.940	2.240

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.400 / 0.14 / T2-0.08	(BB-0.08) / sin60*2/3 0.3	12	1.281	0	1.281	7 x 4 = 28	(X - 0.08)/0.30 + 1 35.857	0.888	31.841
EDGE BEAM	E101	2.148	Xs - 0.08 / sin60 -	18	2.148	0	2.148	10 x 2 = 20	as per table 42.95	2.00	85.910
EDGE BEAM	E102	2.148	-	14	2.148	0	2.148	2 x 2 = 4	as per table 8.59	1.21	10.395
EDGE BEAM	E103	WC-0.08)/sin6 / 0.174 / 0.24 / T2 - 0.08 / 0.14 / 0.15	T2+0.10-0.08 0.2 constant	12	0.854	0	0.854	10 x 2 = 20	(X - 0.08)/0.20 + 1 17.09	0.89	15.172
END BARREL KEY	H301	2.148	Xs - 0.08 / sin60 -	24	2.148	0	2.148	4 x 2 = 8	as per table 17.182	3.55	60.996
END BARREL KEY	H302	0.370 / 0.396 / 0.28 / T1+0.10-0.08 / 0.370	(0.40-0.08)/sin60 0.15 sqrt(0.28^2*2) (0.40-0.08)/sin60	14	1.415	0	1.415	13 x 2 = 26	(X - 0.08)/0.15 + 1 36.790	1.21	44.515
END BARREL KEY	H300 *WALL*	0.924	0.08/sin60 0.3	16	0.924	0	0.924	4 x 4 = 16	(X - 0.06)/0.30 + 1 14.78	1.58	23.353
END BARREL KEY	H300 *BOT.SLAB*	0.924	0.08/sin60 0.15	16	0.924	0	0.924	13 x 2 = 26	(X - 0.08)/0.15 + 1 24.02	1.58	37.948
END BARREL KEY	WALL *EXP. JT.*	0.800	constant 0.3	16	0.800	0	0.800	4 x 4 = 16	(X - 0.06)/0.30 + 1 12.80	1.58	20.224
END BARREL KEY	Top & Bot. *EXP. JT.*	0.800	constant 0.15	16	0.800	0	0.800	26 x 2 = 52	(X - 0.08)/0.30 + 1 41.60	1.58	65.728
										SUB TOTAL =	**396.082**

Station **37 + 452.180** **skew** **60 °** **INLET**

CELL NO.	S SPAN	H HEIGHT	T1 BOT.SLAB	T2 TOP SLAB	W1 EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41320°	2.29060°	S+2W1	1.940	2.579
	0.15				Side Slope angle		0.10	-1.0	Culvert Slope angle		
If S=1.00, 0.05;1.50,0.15;2.00,0.10;2.50,0.05;3.00,0.15;3.50,0.10					If Side Slope angle is > 21.8°=0.10 & if less=0.20			If structure is Inlet= -1.0 & if Outlet=1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	(X1-0.08)/sin60 2.148	as T1+0.1-0.08-0.04	14	2.148	0.00	2.148	2 x 1 = 2	as per table 4.295	1.21	5.198
	H202	constant 0.25 0.24 0.392 0.378	sqrt((T1-0.02)^2*2)/sin60 0.15 (0.40-0.073)/sin60	14	1.260	0	1.260	13 x 1 = 13	(X1-0.08)/0.15 + 1 16.374	1.21	19.812
	A100	(x-0.08)/sin60 2.464	as Sqrt(W1+0.28-0.08)^2*2)	12	2.464	0	2.464	6 x 2 = 12	as per table 29.562	0.89	26.251
	F201	constant 0.25 0.552 0.262 sqrt(0.235^2*2 0.247	0.22 0.2 T1+0.10-0.04-0.033	.25+0.10-0.12 14	1.530	0	1.530	13 x 2 = 26	(L1-0.08)/0.20 + 1 39.784	1.21	48.139
	F300 G300	(X1-0.08)/sin60 2.464	0.15 (max + min) / 2	12	2.464	0	2.464	13 x 2 = 26	(S - 0.15*2)/0.15 + 1 + 4 64.052	0.89	56.878
	L3 F301	ave =1.090 x=0.15 max =1.454 min =0.726	constant 0.2 X1-0.04-spcng*tan60-0.05/cos60 (L-spacing*(no.of pieces))*tan60-0.04-0.05/cos60	12	1.240	0	1.240	4 x 2 = 8	(-0.5+X1/tan60)/0.20+1 9.918	0.888	8.808
	L3 G301	ave =1.090 x=0.15 max =1.454 min =0.726	constant 0.2 X1-0.04-spcng*tan60-0.05/cos60 (0.50*tan60-0.04-0.05/cos60	12	1.240	0	1.240	4 x 2 = 8	(-0.5+X1/tan60)/0.20+1 9.918	0.888	8.808
	L4 F301	1.860 x=0.15	X1-0.08 0.2 constant	12	2.160	0	2.160	8 x 1 = 8	(L-X1/tan60)/0.20 17.280	0.888	15.345
	L4 G301	1.860 x=0.15	X1-0.08 0.2 constant	12	2.160	0	2.160	8 x 1 = 8	(L-X1/tan60)/0.20 17.280	0.888	15.345
									TOTAL FOR INLET APRON		**204.583**

Station 37 + 452.180 **skew** 60 °

CELL NO.	S SPAN	H HEIGHT	T1 BOT.SLAB	T2 TOP SLAB	W1 EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41320°	-2.29060°	S+2W1	1.940	2.579
							0.4330	-0.040			

Side Slope angle; Side Slope; Culvert Slope angle; If structure is Inlet=neg. sign & if Outlet=pos. sign

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	sqrt((L1-0.17)^2+(H+T2-0.05)^2) 2.678	as	12	2.678	0	2.678	2 x 2 = 4	constant 10.712	0.89	9.513
	B101	0.15 ave =0.730 0.28 max =1.302 min =0.158	constant 0.15 W1+0.10-0.04 (H+T2+0.17)/cos(culv. slope)-0.05/cos(side slope)-0.08*tan(side slope) 0.17+0.09*tan(culv. slope)-0.05/cos(side slope)-0.09*tan(culv. Slope)	14	1.160	0	1.160	17 x 2 = 34	(L1-0.17)/0.15+1 39.44	1.21	47.724
	C101	0.15 ave =0.730 0.14 max =1.302 min =0.158	constant 0.15 W1-0.08 (H+T2+0.17)/cos(culv. slope)-0.05/cos(side slope)-0.08*tan(side slope) 0.17+0.09*tan(culv. slope)-0.05/cos(side slope)-0.09*tan(culv. Slope)	12	1.020	0	1.020	17 x 2 = 34	(L1-0.17)/0.15+1 34.68	0.89	30.797
	A101	ide slope angle is >21.8, 0.26 ; if less = 0.11 ave =1.284 max =2.174 0.26 min =0.395	0.15 (L1-0.08/cos(culv.slope)-0.10/(0.50 - -0.008)-0.05/sin(side slope) 0.26/tan(side slope)-0.08-0.05/sin(side slope)	12	1.284	0	1.284	7 x 4 = 28	(H+T2-0.10-0.26)/0.15+1 35.965	0.89	31.937
	A300	sqrt(0.14^2*2 0.229 0.006 0.140 constant 0.5	constant 0.15 W1-0.08	12	0.929	0	0.929	8 x 2 = 16	(H+T2-0.11)/0.15+1 14.858	0.89	13.194
	B109	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	20	1.720	0	1.720	1 x 2 = 2	constant 3.440	2.47	8.497
	B110	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	20	1.720	0	1.720	1 x 2 = 2	constant 3.440	2.47	8.497
	B116	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	20	1.720	0	1.720	2 x 2 = 4	constant 6.880	2.47	16.994
	C189	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	12	1.720	0	1.720	1 x 2 = 2	constant 3.440	0.89	3.055
	C190	0.300 1.42	constant as H+T1+T2+0.10-0.08-0.08	12	1.720	0	1.720	1 x 2 = 2	constant 3.440	0.89	3.055
									TOTAL FOR INLET WING WALL		**173.261**

Station 37 + 452.180 **skew** 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.413 °			1.940	2.579

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
TOE WALL (INLET)	A205	(X4 - 0.08)/sin60 2.148	as	14	2.148	0	2.148	10 x 1 = 10	If inlet=10 but if outlet=20 21.477	1.21	25.988
	A203	0.173 0.774 0.800 .25-0.08)/sin6 0.196	0.15/sin60 (0.25+0.5-0.08)/sin60 0.15 If inlet=0.80 but if outlet=1.80	14	2.743	0	2.743	15 x 1 = 15	(L1-0.08)/0.15+1 41.147	1.21	49.788
									TOTAL FOR INLET TOE WALL		**75.776**

Station **37 + 452.180** **skew** **60 ∘ OUTLET** → Same as in inlet formula

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41 °	2.29060°		1.940	3.104
	0.15						0.10	1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	2.148	as	14	2.148	0.00	2.148	2 x 1 = 2	4.295	1.21	5.198
	H202	0.25 0.24 0.392 0.378	0.15	14	1.260	0	1.260	13 x 1 = 13	16.374	1.21	19.812
	A100	2.989	as	12	2.989	0	2.989	6 x 2 = 12	35.862	0.888	31.846
	F201	0.25 0.552 0.276 0.247	0.23 0.2	14	1.554	0	1.554	16 x 2 = 32	49.738	1.21	60.183
	F300 G300	2.989	0.15	12	2.989	0	2.989	13 x 2 = 26	77.702	0.888	68.999
	L3 F301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L3 G301	ave =1.090 x=0.15 max =1.454 min =0.726	0.2	12	1.240	0	1.240	4 x 2 = 8	9.918	0.888	8.808
	L4 F301	1.860 x=0.15	0.2	12	2.160	0	2.160	11 x 1 = 11	23.760	0.888	21.099
	L4 G301	1.860 x=0.15	0.2	12	2.160	0	2.160	11 x 1 = 11	23.760	0.888	21.099
									TOTAL FOR OUTLET APRON		**245.851**

Station 37 + 452.180 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.41320°	2.29060°		1.940	3.104
							0.4330	0.040			

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	3.159	as	12	3.159	0	3.159	2 x 2 = 4	12.635	0.888	11.220
	B101	0.15 ave =0.726 0.28 max =1.302 min =0.151	0.15	14	1.156	0	1.156	21 x 2 = 42	48.57	1.210	58.770
	C101	0.15 ave =0.726 0.14 max =1.302 min =0.151	0.15	12	1.016	0	1.016	21 x 2 = 42	42.69	0.888	37.909
	A101	ave =1.514 max =2.633 0.26 min =0.395	0.15	12	1.514	0	1.514	7 x 4 = 28	42.390	0.888	37.642
	A300	0.229 0.06 0.140 0.5	0.15	12	0.929	0	0.929	8 x 2 = 16	14.858	0.888	13.194
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
									TOTAL FOR OUTLET WING WALL		**198.831**

Station 37 + 452.180 skew 60 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	23.413 °			1.940	3.104
TOE WALL (OUTLET)	A205	2.148	as	14	2.148	0	2.148	20 x 1 = 20	42.955	1.21	51.975
	A204	0.173 0.774 1.800 0.196	0.15	14	4.743	0	4.743	15 x 1 = 15	71.147	1.21	86.088
									TOTAL FOR OUTLET TOE WALL		**138.064**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 37 + 452.180 skew 60° Right

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.23	0.60	Skew 44.494	1.940	2.240

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	31.841	536.728
E103		15.172	
W.W.		489.715	
A	14	580.610	5,129.851
B		579.898	
D		561.702	
F		463.624	
G		401.309	
LONG'L		2,009.124	
E102		10.395	
H302		44.515	
W.W.		478.675	
H300	16	61.301	147.253
E.J		85.952	
E101	18	85.910	85.910
W.W.	20	67.974	67.974
	22	0.000	0.000
H301	24	60.996	60.996
	25	0.000	0.000
		TOTAL WEIGHT =	**6,028.712**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 5030308 CONCRETE FOR BOX CULVERT 270/20 Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37 + 452.180 skew 60° Right

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.231	0.60	Skew 44.494	1.940	2.240

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	18.990
BOTTOM SLAB	Vol. = Length * X * T1	22.443
OUTER WALLS	Vol. = Length * H * 2W1	19.577
INNER WALLS	Vol. = Length * H * W2	0.000
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.045
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.202
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2	0.111
	TOTAL VOLUME =	**61.368**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37 + 452.180 skew 60° Right

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	2.579	3.104	0.250	1.940	2.240

X2	SLOPE
0.2	2.309 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	1.251
APRON OUTLET	Vol. = Lo * X * T	1.505
TOE WALL INLET	Vol. = XS * T * (1-T)	0.420
TOE WALL OUTLET	Vol. = XS * T * (2-T)	0.980
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.628
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.755
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.000
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.000
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.180
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.230
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.000
KEY BLOCKS INNER W.W. OUTLET	ol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.000
END KEY BLOCKS OUTER (INLET &	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)*2	0.224
	TOTAL VOLUME =	**6.173**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

SLOPE = 2 : 1

SKEW = 45 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT				DIMENSION		REINFORCEMENT			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	1.40	1.99	12 F 301 THRU 12 F	305	12 G 301 THRU 12 G	305	2.60	0.79	12 F 301 THRU 12 F	313	12 G 301 THRU 12 G	313
1.50	1.00	0.22	0.20	1.94	1.51	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	3.45	0.19	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319
	1.50	0.22	0.22	1.94	2.92	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	3.66	1.20	12 F 301 THRU 12 F	320	12 G 301 THRU 12 G	320
2.00	1.00	0.24	0.20	2.48	1.03	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	3.51	1.17	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319
	1.50	0.24	0.22	2.48	2.44	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	4.70	0.22	12 F 301 THRU 12 F	327	12 G 301 THRU 12 G	327
	2.00	0.24	0.24	2.48	3.86	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	4.72	1.62	12 F 301 THRU 12 F	327	12 G 301 THRU 12 G	327
2.50	1.00	0.28	0.20	3.06	0.56	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316	3.62	2.14	12 F 301 THRU 12 F	320	12 G 301 THRU 12 G	320
	1.50	0.28	0.22	3.06	1.97	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316	5.03	0.75	12 F 301 THRU 12 F	329	12 G 301 THRU 12 G	329
	2.00	0.28	0.24	3.06	3.39	14 F 301 THRU 14 F	316	12 G 301 THRU 12 G	316	5.80	0.65	12 F 301 THRU 12 F	334	12 G 301 THRU 12 G	334
	2.50	0.28	0.26	3.06	4.80	14 F 301 THRU 14 F	316	12 G 301 THRU 12 G	316	5.82	2.04	12 F 301 THRU 12 F	334	12 G 301 THRU 12 G	334
3.00	1.00	0.32	0.20	3.64	0.09	14 F 301 THRU 14 F	320	12 G 301 THRU 12 G	320	3.73	3.11	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
	1.50	0.32	0.22	3.64	1.51	14 F 301 THRU 14 F	320	12 G 301 THRU 12 G	320	5.15	1.71	12 F 301 THRU 12 F	330	12 G 301 THRU 12 G	330
	2.00	0.32	0.24	3.64	2.92	14 F 301 THRU 14 F	320	12 G 301 THRU 12 G	320	6.56	0.32	12 F 301 THRU 12 F	339	12 G 301 THRU 12 G	339
	2.50	0.32	0.26	3.64	4.34	14 F 301 THRU 14 F	320	12 G 301 THRU 12 G	320	6.90	1.08	14 F 301 THRU 14 F	342	12 G 301 THRU 12 G	342
	3.00	0.32	0.28	3.64	5.75	16 F 301 THRU 16 F	320	12 G 301 THRU 12 G	320	6.92	2.47	14 F 301 THRU 14 F	342	12 G 301 THRU 12 G	342
3.50	1.00	0.36	0.20	3.85	0.37	16 F 301 THRU 16 F	321	12 G 301 THRU 12 G	321	3.85	4.07	14 F 301 THRU 14 F	321	12 G 301 THRU 12 G	321
	1.50	0.36	0.22	4.22	1.04	16 F 301 THRU 16 F	324	12 G 301 THRU 12 G	324	5.26	2.68	14 F 301 THRU 14 F	331	12 G 301 THRU 12 G	331
	2.00	0.36	0.24	4.22	2.46	16 F 301 THRU 16 F	324	12 G 301 THRU 12 G	324	6.68	1.28	14 F 301 THRU 14 F	340	12 G 301 THRU 12 G	340
	2.50	0.36	0.26	4.22	3.87	16 F 301 THRU 16 F	324	12 G 301 THRU 12 G	324	7.98	0.11	14 F 301 THRU 14 F	349	12 G 301 THRU 12 G	349
	3.00	0.36	0.28	4.22	5.28	16 F 301 THRU 16 F	324	12 G 301 THRU 12 G	324	8.00	1.50	14 F 301 THRU 14 F	349	12 G 301 THRU 12 G	349

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT				DIMENSION		REINFORCEMENT			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	3.39	0.41	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	3.39	1.61	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
1.50	1.00	0.22	0.20	3.45	1.89	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319	3.45	3.59	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319
	1.50	0.22	0.22	4.86	0.52	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328	4.86	2.24	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328
2.00	1.00	0.24	0.20	3.51	3.37	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319	3.51	5.57	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319
	1.50	0.24	0.22	4.92	2.00	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328	4.92	4.22	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328
	2.00	0.24	0.24	6.34	0.62	12 F 301 THRU 12 F	338	12 G 301 THRU 12 G	338	6.34	2.86	12 F 301 THRU 12 F	338	12 G 301 THRU 12 G	338
2.50	1.00	0.28	0.20	3.62	4.84	12 F 301 THRU 12 F	320	12 G 301 THRU 12 G	320	3.62	7.54	12 F 301 THRU 12 F	320	12 G 301 THRU 12 G	320
	1.50	0.28	0.22	5.03	3.47	12 F 301 THRU 12 F	329	12 G 301 THRU 12 G	329	5.03	6.19	12 F 301 THRU 12 F	329	12 G 301 THRU 12 G	329
	2.00	0.28	0.24	6.45	2.09	12 F 301 THRU 12 F	339	12 G 301 THRU 12 G	339	6.45	4.83	12 F 301 THRU 12 F	339	12 G 301 THRU 12 G	339
	2.50	0.28	0.26	7.86	0.72	12 F 301 THRU 12 F	348	12 G 301 THRU 12 G	348	7.86	3.48	12 F 301 THRU 12 F	348	12 G 301 THRU 12 G	348
3.00	1.00	0.32	0.20	3.73	6.31	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321	3.73	9.51	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
	1.50	0.32	0.22	5.15	4.93	12 F 301 THRU 12 F	330	12 G 301 THRU 12 G	330	5.15	8.15	12 F 301 THRU 12 F	330	12 G 301 THRU 12 G	330
	2.00	0.32	0.24	6.56	3.56	12 F 301 THRU 12 F	339	12 G 301 THRU 12 G	339	6.56	6.80	14 F 301 THRU 14 F	339	12 G 301 THRU 12 G	339
	2.50	0.32	0.26	7.98	2.18	14 F 301 THRU 14 F	349	12 G 301 THRU 12 G	349	7.98	5.44	14 F 301 THRU 14 F	349	12 G 301 THRU 12 G	349
	3.00	0.32	0.28	9.39	0.81	14 F 301 THRU 14 F	358	12 G 301 THRU 12 G	358	9.39	4.09	14 F 301 THRU 14 F	358	12 G 301 THRU 12 G	358
3.50	1.00	0.36	0.20	3.85	7.77	14 F 301 THRU 14 F	321	12 G 301 THRU 12 G	321	3.85	11.47	14 F 301 THRU 14 F	321	14 G 301 THRU 14 G	321
	1.50	0.36	0.22	5.26	6.40	14 F 301 THRU 14 F	331	12 G 301 THRU 12 G	331	5.26	10.12	14 F 301 THRU 14 F	331	14 G 301 THRU 14 G	331
	2.00	0.36	0.24	6.68	5.02	14 F 301 THRU 14 F	340	12 G 301 THRU 12 G	340	6.68	8.76	14 F 301 THRU 14 F	340	14 G 301 THRU 14 G	340
	2.50	0.36	0.26	8.09	3.65	14 F 301 THRU 14 F	350	12 G 301 THRU 12 G	350	8.09	7.41	14 F 301 THRU 14 F	350	14 G 301 THRU 14 G	350
	3.00	0.36	0.28	9.50	2.28	14 F 301 THRU 14 F	359	12 G 301 THRU 12 G	359	9.50	6.06	14 F 301 THRU 14 F	359	14 G 301 THRU 14 G	359

SLOPE = 2 : 1

SKEW = 60 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT				DIMENSION		REINFORCEMENT			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	0.81	1.96	12 F 301 THRU 12 F	301	12 G 301 THRU 12 G	301	1.50	1.27	12 F 301 THRU 12 F	306	12 G 301 THRU 12 G	306
1.50	1.00	0.22	0.20	1.12	1.70	12 F 301 THRU 12 F	303	12 G 301 THRU 12 G	303	2.10	0.72	12 F 301 THRU 12 F	310	12 G 301 THRU 12 G	310
	1.50	0.22	0.22	1.12	2.85	12 F 301 THRU 12 F	303	12 G 301 THRU 12 G	303	2.11	1.86	12 F 301 THRU 12 F	310	12 G 301 THRU 12 G	310
2.00	1.00	0.24	0.20	1.43	1.43	12 F 301 THRU 12 F	305	12 G 301 THRU 12 G	305	2.70	0.16	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314
	1.50	0.24	0.22	1.43	2.59	12 F 301 THRU 12 F	305	12 G 301 THRU 12 G	305	2.71	1.31	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314
	2.00	0.24	0.24	1.43	3.74	12 F 301 THRU 12 F	305	12 G 301 THRU 12 G	305	2.73	2.44	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314
2.50	1.00	0.28	0.20	1.77	1.19	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	2.96	0.37	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
	1.50	0.28	0.22	1.77	2.34	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.34	0.77	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
	2.00	0.28	0.24	1.77	3.50	14 F 301 THRU 14 F	307	12 G 301 THRU 12 G	307	3.35	1.92	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
	2.50	0.28	0.26	1.77	4.65	14 F 301 THRU 14 F	307	12 G 301 THRU 12 G	307	3.36	3.06	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
3.00	1.00	0.32	0.20	2.10	0.95	14 F 301 THRU 14 F	310	12 G 301 THRU 12 G	310	3.05	0.90	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316
	1.50	0.32	0.22	2.10	2.10	14 F 301 THRU 14 F	310	12 G 301 THRU 12 G	310	3.96	0.24	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
	2.00	0.32	0.24	2.10	3.26	14 F 301 THRU 14 F	310	12 G 301 THRU 12 G	310	3.97	1.39	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
	2.50	0.32	0.26	2.10	4.41	14 F 301 THRU 14 F	310	12 G 301 THRU 12 G	310	3.98	2.53	14 F 301 THRU 14 F	322	12 G 301 THRU 12 G	322
	3.00	0.32	0.28	2.10	5.57	16 F 301 THRU 16 F	310	12 G 301 THRU 12 G	310	4.00	3.67	14 F 301 THRU 14 F	322	12 G 301 THRU 12 G	322
3.50	1.00	0.36	0.20	2.44	0.70	16 F 301 THRU 16 F	312	12 G 301 THRU 12 G	312	3.14	1.43	14 F 301 THRU 14 F	317	12 G 301 THRU 12 G	317
	1.50	0.36	0.22	2.44	1.86	16 F 301 THRU 16 F	312	12 G 301 THRU 12 G	312	4.30	0.28	14 F 301 THRU 14 F	324	12 G 301 THRU 12 G	324
	2.00	0.36	0.24	2.44	3.01	16 F 301 THRU 16 F	312	12 G 301 THRU 12 G	312	4.60	0.85	14 F 301 THRU 14 F	326	12 G 301 THRU 12 G	326
	2.50	0.36	0.26	2.44	4.16	16 F 301 THRU 16 F	312	12 G 301 THRU 12 G	312	4.61	1.99	14 F 301 THRU 14 F	326	12 G 301 THRU 12 G	326
	3.00	0.36	0.28	2.44	5.32	16 F 301 THRU 16 F	312	12 G 301 THRU 12 G	312	4.62	3.14	14 F 301 THRU 14 F	326	12 G 301 THRU 12 G	326

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT				DIMENSION		REINFORCEMENT			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	2.19	0.58	12 F 301 THRU 12 F	310	12 G 301 THRU 12 G	310	2.77	0.12	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314
1.50	1.00	0.22	0.20	2.82	0.26	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314	2.82	1.24	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314
	1.50	0.22	0.22	3.11	0.86	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316	3.97	0.13	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
2.00	1.00	0.24	0.20	2.86	1.11	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	2.86	2.38	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
	1.50	0.24	0.22	4.00	0.02	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322	4.02	1.26	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
	2.00	0.24	0.24	4.02	1.15	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322	5.17	0.14	12 F 301 THRU 12 F	330	12 G 301 THRU 12 G	330
2.50	1.00	0.28	0.20	2.96	1.92	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	2.96	3.48	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
	1.50	0.28	0.22	4.11	0.80	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323	4.11	2.37	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323
	2.00	0.28	0.24	4.93	0.34	12 F 301 THRU 12 F	329	12 G 301 THRU 12 G	329	5.27	1.24	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
	2.50	0.28	0.26	4.95	1.47	12 F 301 THRU 12 F	329	12 G 301 THRU 12 G	329	6.42	0.13	12 F 301 THRU 12 F	338	12 G 301 THRU 12 G	338
3.00	1.00	0.32	0.20	3.05	2.75	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316	3.05	4.59	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316
	1.50	0.32	0.22	4.20	1.62	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324	4.20	3.48	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324
	2.00	0.32	0.24	5.36	0.48	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331	5.36	2.35	14 F 301 THRU 14 F	331	12 G 301 THRU 12 G	331
	2.50	0.32	0.26	5.87	0.64	14 F 301 THRU 14 F	335	12 G 301 THRU 12 G	335	6.51	1.24	14 F 301 THRU 14 F	339	12 G 301 THRU 12 G	339
	3.00	0.32	0.28	5.89	1.78	14 F 301 THRU 14 F	335	12 G 301 THRU 12 G	335	7.67	0.11	14 F 301 THRU 14 F	347	12 G 301 THRU 12 G	347
3.50	1.00	0.36	0.20	3.14	3.57	14 F 301 THRU 14 F	317	12 G 301 THRU 12 G	317	3.14	5.70	14 F 301 THRU 14 F	317	14 G 301 THRU 14 G	317
	1.50	0.36	0.22	4.30	2.43	14 F 301 THRU 14 F	324	12 G 301 THRU 12 G	324	4.30	4.58	14 F 301 THRU 14 F	324	14 G 301 THRU 14 G	324
	2.00	0.36	0.24	5.45	1.30	14 F 301 THRU 14 F	332	12 G 301 THRU 12 G	332	5.45	3.46	14 F 301 THRU 14 F	332	14 G 301 THRU 14 G	332
	2.50	0.36	0.26	6.60	0.18	14 F 301 THRU 14 F	340	12 G 301 THRU 12 G	340	6.60	2.35	14 F 301 THRU 14 F	340	14 G 301 THRU 14 G	340
	3.00	0.36	0.28	6.80	0.96	14 F 301 THRU 14 F	341	12 G 301 THRU 12 G	341	7.76	1.22	14 F 301 THRU 14 F	347	14 G 301 THRU 14 G	347

SLOPE = 3 : 1

SKEW = 45 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	1.40	3.69	12 F 301 THRU 12 F	304	12 G 301 THRU 12 G	304	2.60	2.49	12 F 301 THRU 12 F	310	12 G 301 THRU 12 G	310
1.50	1.00	0.22	0.20	1.94	3.24	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.64	1.54	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
	1.50	0.22	0.22	1.94	5.36	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.66	3.64	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
2.00	1.00	0.24	0.20	2.48	2.78	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	4.68	0.58	12 F 301 THRU 12 F	320	12 G 301 THRU 12 G	320
	1.50	0.24	0.22	2.48	4.90	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	4.70	2.68	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
	2.00	0.24	0.24	2.48	7.02	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	4.72	4.78	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
2.50	1.00	0.28	0.20	3.06	2.37	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.43	0.33	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324
	1.50	0.28	0.22	3.06	4.49	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.78	1.77	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
	2.00	0.28	0.24	3.06	6.61	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.80	3.87	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
	2.50	0.28	0.26	3.06	8.73	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.82	5.97	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
3.00	1.00	0.32	0.20	3.64	1.96	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	5.60	1.24	12 F 301 THRU 12 F	325	12 G 301 THRU 12 G	325
	1.50	0.32	0.22	3.64	4.08	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.86	0.86	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
	2.00	0.32	0.24	3.64	6.20	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.88	2.96	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
	2.50	0.32	0.26	3.64	8.32	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.90	5.06	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332
	3.00	0.32	0.28	3.64	10.45	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.92	7.17	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332
3.50	1.00	0.36	0.20	4.22	1.55	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	5.77	2.15	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
	1.50	0.36	0.22	4.22	3.67	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	7.89	0.05	12 F 301 THRU 12 F	336	12 G 301 THRU 12 G	336
	2.00	0.36	0.24	4.22	5.79	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	7.96	2.05	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337
	2.50	0.36	0.26	4.22	7.91	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	7.98	4.15	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337
	3.00	0.36	0.28	4.22	10.04	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	8.00	6.26	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	3.80	1.29	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316	5.00	0.09	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
1.50	1.00	0.22	0.20	5.18	0.16	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323	5.18	1.86	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323
	1.50	0.22	0.22	5.38	1.92	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324	7.10	0.20	12 F 301 THRU 12 F	333	12 G 301 THRU 12 G	333
2.00	1.00	0.24	0.20	5.26	1.62	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323	5.26	3.82	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323
	1.50	0.24	0.22	6.92	0.46	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332	7.38	1.76	12 F 301 THRU 12 F	334	12 G 301 THRU 12 G	334
	2.00	0.24	0.24	6.96	2.54	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332	9.20	0.30	12 F 301 THRU 12 F	343	12 G 301 THRU 12 G	343
2.50	1.00	0.28	0.20	5.43	3.03	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324	5.43	5.73	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324
	1.50	0.28	0.22	7.55	0.95	12 F 301 THRU 12 F	335	12 G 301 THRU 12 G	335	7.55	3.67	12 F 301 THRU 12 F	335	12 G 301 THRU 12 G	335
	2.00	0.28	0.24	8.54	1.13	12 F 301 THRU 12 F	340	12 G 301 THRU 12 G	340	9.67	1.61	12 F 301 THRU 12 F	345	12 G 301 THRU 12 G	345
	2.50	0.28	0.26	8.58	3.21	12 F 301 THRU 12 F	340	12 G 301 THRU 12 G	340	11.34	0.45	12 F 301 THRU 12 F	354	12 G 301 THRU 12 G	354
3.00	1.00	0.32	0.20	5.60	4.44	12 F 301 THRU 12 F	325	12 G 301 THRU 12 G	325	5.60	7.64	12 F 301 THRU 12 F	325	12 G 301 THRU 12 G	325
	1.50	0.32	0.22	7.72	2.36	12 F 301 THRU 12 F	336	12 G 301 THRU 12 G	336	7.72	5.58	12 F 301 THRU 12 F	336	12 G 301 THRU 12 G	336
	2.00	0.32	0.24	9.84	0.28	12 F 301 THRU 12 F	346	12 G 301 THRU 12 G	346	9.84	3.52	12 F 301 THRU 12 F	346	12 G 301 THRU 12 G	346
	2.50	0.32	0.26	10.16	1.80	12 F 301 THRU 12 F	348	12 G 301 THRU 12 G	348	11.96	1.46	12 F 301 THRU 12 F	357	12 G 301 THRU 12 G	357
	3.00	0.32	0.28	10.20	3.89	12 F 301 THRU 12 F	348	12 G 301 THRU 12 G	348	13.48	0.61	12 F 301 THRU 12 F	364	12 G 301 THRU 12 G	364
3.50	1.00	0.36	0.20	5.77	5.85	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326	5.77	9.55	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
	1.50	0.36	0.22	7.89	3.77	12 F 301 THRU 12 F	336	12 G 301 THRU 12 G	336	7.89	7.49	12 F 301 THRU 12 F	336	12 G 301 THRU 12 G	336
	2.00	0.36	0.24	10.01	1.69	12 F 301 THRU 12 F	347	12 G 301 THRU 12 G	347	10.01	5.43	12 F 301 THRU 12 F	347	12 G 301 THRU 12 G	347
	2.50	0.36	0.26	11.74	0.39	12 F 301 THRU 12 F	356	12 G 301 THRU 12 G	356	12.13	3.37	12 F 301 THRU 12 F	358	12 G 301 THRU 12 G	358
	3.00	0.36	0.28	11.78	2.48	12 F 301 THRU 12 F	356	12 G 301 THRU 12 G	356	14.26	1.30	12 F 301 THRU 12 F	368	12 G 301 THRU 12 G	368

SLOPE = 3 : 1

SKEW = 60 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	0.81	3.35	12 F 301 THRU 12 F	303	12 G 301 THRU 12 G	303	1.50	2.66	12 F 301 THRU 12 F	306	12 G 301 THRU 12 G	306
1.50	1.00	0.22	0.20	1.12	3.11	12 F 301 THRU 12 F	304	12 G 301 THRU 12 G	304	2.10	2.13	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309
	1.50	0.22	0.22	1.12	4.84	12 F 301 THRU 12 F	304	12 G 301 THRU 12 G	304	2.11	3.85	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309
2.00	1.00	0.24	0.20	1.43	2.87	12 F 301 THRU 12 F	306	12 G 301 THRU 12 G	306	2.70	1.60	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312
	1.50	0.24	0.22	1.43	4.60	12 F 301 THRU 12 F	306	12 G 301 THRU 12 G	306	2.71	3.32	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312
	2.00	0.24	0.24	1.43	6.33	12 F 301 THRU 12 F	306	12 G 301 THRU 12 G	306	2.73	5.03	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312
2.50	1.00	0.28	0.20	1.77	2.66	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.33	1.10	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
	1.50	0.28	0.22	1.77	4.40	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.34	2.83	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
	2.00	0.28	0.24	1.77	6.13	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.35	4.55	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
	2.50	0.28	0.26	1.77	7.86	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.36	6.27	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
3.00	1.00	0.32	0.20	2.10	2.47	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	3.95	0.62	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
	1.50	0.32	0.22	2.10	4.20	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	3.96	2.34	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
	2.00	0.32	0.24	2.10	5.94	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	3.97	4.07	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
	2.50	0.32	0.26	2.10	7.67	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	3.98	5.79	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
	3.00	0.32	0.28	2.10	9.40	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	4.00	7.50	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319
3.50	1.00	0.36	0.20	2.44	2.27	12 F 301 THRU 12 F	311	12 G 301 THRU 12 G	311	4.57	0.14	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
	1.50	0.36	0.22	2.44	4.00	12 F 301 THRU 12 F	311	12 G 301 THRU 12 G	311	4.58	1.86	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
	2.00	0.36	0.24	2.44	5.74	12 F 301 THRU 12 F	311	12 G 301 THRU 12 G	311	4.60	3.58	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
	2.50	0.36	0.26	2.44	7.47	12 F 301 THRU 12 F	311	12 G 301 THRU 12 G	311	4.61	5.30	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
	3.00	0.36	0.28	2.44	9.20	12 F 301 THRU 12 F	311	12 G 301 THRU 12 G	311	4.62	7.02	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	2.19	1.97	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	2.89	1.27	12 F 301 THRU 12 F	313	12 G 301 THRU 12 G	313
1.50	1.00	0.22	0.20	3.08	1.15	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314	4.06	0.17	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319
	1.50	0.22	0.22	3.11	2.85	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314	4.10	1.86	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319
2.00	1.00	0.24	0.20	3.97	0.33	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	4.30	0.94	12 F 301 THRU 12 F	320	12 G 301 THRU 12 G	320
	1.50	0.24	0.22	4.00	2.03	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319	5.28	0.75	12 F 301 THRU 12 F	325	12 G 301 THRU 12 G	325
	2.00	0.24	0.24	4.02	3.74	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319	5.31	2.45	12 F 301 THRU 12 F	325	12 G 301 THRU 12 G	325
2.50	1.00	0.28	0.20	4.43	0.45	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321	4.43	2.01	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
	1.50	0.28	0.22	4.91	1.26	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323	6.17	0.31	12 F 301 THRU 12 F	329	12 G 301 THRU 12 G	329
	2.00	0.28	0.24	4.93	2.97	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323	6.51	1.39	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
	2.50	0.28	0.26	4.95	4.68	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323	6.55	3.08	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
3.00	1.00	0.32	0.20	4.57	1.23	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321	4.57	3.07	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
	1.50	0.32	0.22	5.82	0.48	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328	6.30	1.38	12 F 301 THRU 12 F	330	12 G 301 THRU 12 G	330
	2.00	0.32	0.24	5.84	2.20	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328	7.71	0.33	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337
	2.50	0.32	0.26	5.87	3.90	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328	7.75	2.02	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337
	3.00	0.32	0.28	5.89	5.61	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328	7.78	3.72	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337
3.50	1.00	0.36	0.20	4.71	2.00	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322	4.71	4.13	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
	1.50	0.36	0.22	6.44	0.29	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331	6.44	2.44	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
	2.00	0.36	0.24	6.75	1.43	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332	8.18	0.73	12 F 301 THRU 12 F	339	12 G 301 THRU 12 G	339
	2.50	0.36	0.26	6.78	3.13	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332	8.95	0.96	12 F 301 THRU 12 F	343	12 G 301 THRU 12 G	343
	3.00	0.36	0.28	6.80	4.84	12 F 301 THRU 12 F	333	12 G 301 THRU 12 G	333	8.98	2.66	12 F 301 THRU 12 F	343	12 G 301 THRU 12 G	343

SLOPE = 4 : 1

SKEW = 45 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	1.40	5.39	12 F 301 THRU 12 F	304	12 G 301 THRU 12 G	304	2.60	4.19	12 F 301 THRU 12 F	310	12 G 301 THRU 12 G	310
1.50	1.00	0.22	0.20	1.94	4.96	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.64	3.26	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
	1.50	0.22	0.22	1.94	7.79	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.66	6.07	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
2.00	1.00	0.24	0.20	2.48	4.53	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	4.68	2.33	12 F 301 THRU 12 F	320	12 G 301 THRU 12 G	320
	1.50	0.24	0.22	2.48	7.36	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	4.70	5.14	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
	2.00	0.24	0.24	2.48	10.19	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	4.72	7.95	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321
2.50	1.00	0.28	0.20	3.06	4.18	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.76	1.48	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
	1.50	0.28	0.22	3.06	7.01	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.78	4.29	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
	2.00	0.28	0.24	3.06	9.84	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.80	7.10	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
	2.50	0.28	0.26	3.06	12.67	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.82	9.91	12 F 301 THRU 12 F	326	12 G 301 THRU 12 G	326
3.00	1.00	0.32	0.20	3.64	3.83	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.84	0.63	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
	1.50	0.32	0.22	3.64	6.66	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.86	3.44	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
	2.00	0.32	0.24	3.64	9.48	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.88	6.24	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
	2.50	0.32	0.26	3.64	12.31	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.90	9.05	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332
	3.00	0.32	0.28	3.64	15.14	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.92	11.86	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332
3.50	1.00	0.36	0.20	4.22	3.47	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	7.69	0.23	12 F 301 THRU 12 F	335	12 G 301 THRU 12 G	335
	1.50	0.36	0.22	4.22	6.30	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	7.94	2.58	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337
	2.00	0.36	0.24	4.22	9.13	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	7.96	5.39	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337
	2.50	0.36	0.26	4.22	11.96	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	7.98	8.20	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337
	3.00	0.36	0.28	4.22	14.79	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	8.00	11.01	12 F 301 THRU 12 F	337	12 G 301 THRU 12 G	337

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	3.80	2.99	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316	5.00	1.79	12 F 301 THRU 12 F	322	12 G 301 THRU 12 G	322
1.50	1.00	0.22	0.20	5.34	1.56	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324	6.90	0.14	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332
	1.50	0.22	0.22	5.38	4.35	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324	7.10	2.63	12 F 301 THRU 12 F	333	12 G 301 THRU 12 G	333
2.00	1.00	0.24	0.20	6.88	0.13	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331	7.01	2.07	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332
	1.50	0.24	0.22	6.92	2.92	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332	9.14	0.70	12 F 301 THRU 12 F	343	12 G 301 THRU 12 G	343
	2.00	0.24	0.24	6.96	5.71	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332	9.20	3.47	12 F 301 THRU 12 F	343	12 G 301 THRU 12 G	343
2.50	1.00	0.28	0.20	7.24	1.22	12 F 301 THRU 12 F	333	12 G 301 THRU 12 G	333	7.24	3.92	12 F 301 THRU 12 F	333	12 G 301 THRU 12 G	333
	1.50	0.28	0.22	8.50	1.57	12 F 301 THRU 12 F	340	12 G 301 THRU 12 G	340	10.07	1.15	12 F 301 THRU 12 F	347	12 G 301 THRU 12 G	347
	2.00	0.28	0.24	8.54	4.36	12 F 301 THRU 12 F	340	12 G 301 THRU 12 G	340	11.28	1.62	12 F 301 THRU 12 F	353	12 G 301 THRU 12 G	353
	2.50	0.28	0.26	8.58	7.15	12 F 301 THRU 12 F	340	12 G 301 THRU 12 G	340	11.34	4.39	12 F 301 THRU 12 F	354	12 G 301 THRU 12 G	354
3.00	1.00	0.32	0.20	7.47	2.57	12 F 301 THRU 12 F	334	12 G 301 THRU 12 G	334	7.47	5.77	12 F 301 THRU 12 F	334	12 G 301 THRU 12 G	334
	1.50	0.32	0.22	10.08	0.22	12 F 301 THRU 12 F	347	12 G 301 THRU 12 G	347	10.30	3.00	12 F 301 THRU 12 F	349	12 G 301 THRU 12 G	349
	2.00	0.32	0.24	10.12	3.00	12 F 301 THRU 12 F	348	12 G 301 THRU 12 G	348	13.12	0.24	12 F 301 THRU 12 F	363	12 G 301 THRU 12 G	363
	2.50	0.32	0.26	10.16	5.79	12 F 301 THRU 12 F	348	12 G 301 THRU 12 G	348	13.42	2.53	12 F 301 THRU 12 F	364	12 G 301 THRU 12 G	364
	3.00	0.32	0.28	10.20	8.58	12 F 301 THRU 12 F	348	12 G 301 THRU 12 G	348	13.48	5.30	12 F 301 THRU 12 F	364	12 G 301 THRU 12 G	364
3.50	1.00	0.36	0.20	7.69	3.93	12 F 301 THRU 12 F	335	12 G 301 THRU 12 G	335	7.69	7.63	12 F 301 THRU 12 F	335	12 G 301 THRU 12 G	335
	1.50	0.36	0.22	10.52	1.14	12 F 301 THRU 12 F	350	12 G 301 THRU 12 G	350	10.52	4.86	12 F 301 THRU 12 F	350	12 G 301 THRU 12 G	350
	2.00	0.36	0.24	11.70	1.65	12 F 301 THRU 12 F	356	12 G 301 THRU 12 G	356	13.35	2.09	12 F 301 THRU 12 F	364	12 G 301 THRU 12 G	364
	2.50	0.36	0.26	11.74	4.44	12 F 301 THRU 12 F	356	12 G 301 THRU 12 G	356	15.50	0.68	12 F 301 THRU 12 F	375	12 G 301 THRU 12 G	375
	3.00	0.36	0.28	11.78	7.23	12 F 301 THRU 12 F	356	12 G 301 THRU 12 G	356	15.56	3.45	12 F 301 THRU 12 F	375	12 G 301 THRU 12 G	375

SLOPE = 4 : 1

SKEW = 60 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL				2 - CELL			
				DIMENSION		REINFORCEMENT (12 @ 0.20)		DIMENSION		REINFORCEMENT (12 @ 0.20)	
S	H	W1/T2	W2	L3	L4	TOP BARS	BOTTOM BARS	L3	L4	TOP BARS	BOTTOM BARS
1.00	1.00	0.20	0.20	0.81	4.73	12 F 301 THRU 12 F 303	12 G 301 THRU 12 G 303	1.50	4.04	12 F 301 THRU 12 F 306	12 G 301 THRU 12 G 306
1.50	1.00	0.22	0.20	1.12	4.51	12 F 301 THRU 12 F 304	12 G 301 THRU 12 G 304	2.10	3.53	12 F 301 THRU 12 F 309	12 G 301 THRU 12 G 309
	1.50	0.22	0.22	1.12	6.82	12 F 301 THRU 12 F 304	12 G 301 THRU 12 G 304	2.11	5.83	12 F 301 THRU 12 F 309	12 G 301 THRU 12 G 309
2.00	1.00	0.24	0.20	1.43	4.30	12 F 301 THRU 12 F 306	12 G 301 THRU 12 G 306	2.70	3.03	12 F 301 THRU 12 F 312	12 G 301 THRU 12 G 312
	1.50	0.24	0.22	1.43	6.61	12 F 301 THRU 12 F 306	12 G 301 THRU 12 G 306	2.71	5.33	12 F 301 THRU 12 F 312	12 G 301 THRU 12 G 312
	2.00	0.24	0.24	1.43	8.92	12 F 301 THRU 12 F 306	12 G 301 THRU 12 G 306	2.73	7.62	12 F 301 THRU 12 F 312	12 G 301 THRU 12 G 312
2.50	1.00	0.28	0.20	1.77	4.14	12 F 301 THRU 12 F 307	12 G 301 THRU 12 G 307	3.33	2.58	12 F 301 THRU 12 F 315	12 G 301 THRU 12 G 315
	1.50	0.28	0.22	1.77	6.45	12 F 301 THRU 12 F 307	12 G 301 THRU 12 G 307	3.34	4.88	12 F 301 THRU 12 F 315	12 G 301 THRU 12 G 315
	2.00	0.28	0.24	1.77	8.76	12 F 301 THRU 12 F 307	12 G 301 THRU 12 G 307	3.35	7.18	12 F 301 THRU 12 F 315	12 G 301 THRU 12 G 315
	2.50	0.28	0.26	1.77	11.07	12 F 301 THRU 12 F 307	12 G 301 THRU 12 G 307	3.36	9.48	12 F 301 THRU 12 F 315	12 G 301 THRU 12 G 315
3.00	1.00	0.32	0.20	2.10	4.00	12 F 301 THRU 12 F 309	12 G 301 THRU 12 G 309	3.95	2.15	12 F 301 THRU 12 F 318	12 G 301 THRU 12 G 318
	1.50	0.32	0.22	2.10	6.31	12 F 301 THRU 12 F 309	12 G 301 THRU 12 G 309	3.96	4.45	12 F 301 THRU 12 F 318	12 G 301 THRU 12 G 318
	2.00	0.32	0.24	2.10	8.62	12 F 301 THRU 12 F 309	12 G 301 THRU 12 G 309	3.97	6.75	12 F 301 THRU 12 F 318	12 G 301 THRU 12 G 318
	2.50	0.32	0.26	2.10	10.93	12 F 301 THRU 12 F 309	12 G 301 THRU 12 G 309	3.98	9.05	12 F 301 THRU 12 F 318	12 G 301 THRU 12 G 318
	3.00	0.32	0.28	2.10	13.23	12 F 301 THRU 12 F 309	12 G 301 THRU 12 G 309	4.00	11.33	12 F 301 THRU 12 F 319	12 G 301 THRU 12 G 319
3.50	1.00	0.36	0.20	2.44	3.84	12 F 301 THRU 12 F 311	12 G 301 THRU 12 G 311	4.57	1.71	12 F 301 THRU 12 F 321	12 G 301 THRU 12 G 321
	1.50	0.36	0.22	2.44	6.15	12 F 301 THRU 12 F 311	12 G 301 THRU 12 G 311	4.58	4.01	12 F 301 THRU 12 F 321	12 G 301 THRU 12 G 321
	2.00	0.36	0.24	2.44	8.46	12 F 301 THRU 12 F 311	12 G 301 THRU 12 G 311	4.60	6.30	12 F 301 THRU 12 F 322	12 G 301 THRU 12 G 322
	2.50	0.36	0.26	2.44	10.77	12 F 301 THRU 12 F 311	12 G 301 THRU 12 G 311	4.61	8.60	12 F 301 THRU 12 F 322	12 G 301 THRU 12 G 322
	3.00	0.36	0.28	2.44	13.08	12 F 301 THRU 12 F 311	12 G 301 THRU 12 G 311	4.62	10.90	12 F 301 THRU 12 F 322	12 G 301 THRU 12 G 322

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL				4 - CELL			
				DIMENSION		REINFORCEMENT (12 @ 0.20)		DIMENSION		REINFORCEMENT (12 @ 0.20)	
S	H	W1/T2	W2	L3	L4	TOP BARS	BOTTOM BARS	L3	L4	TOP BARS	BOTTOM BARS
1.00	1.00	0.20	0.20	2.19	3.35	12 F 301 THRU 12 F 309	12 G 301 THRU 12 G 309	2.89	2.65	12 F 301 THRU 12 F 313	12 G 301 THRU 12 G 313
1.50	1.00	0.22	0.20	3.08	2.55	12 F 301 THRU 12 F 314	12 G 301 THRU 12 G 314	4.06	1.57	12 F 301 THRU 12 F 319	12 G 301 THRU 12 G 319
	1.50	0.22	0.22	3.11	4.83	12 F 301 THRU 12 F 314	12 G 301 THRU 12 G 314	4.10	3.84	12 F 301 THRU 12 F 319	12 G 301 THRU 12 G 319
2.00	1.00	0.24	0.20	3.97	1.76	12 F 301 THRU 12 F 318	12 G 301 THRU 12 G 318	5.24	0.49	12 F 301 THRU 12 F 325	12 G 301 THRU 12 G 325
	1.50	0.24	0.22	4.00	4.04	12 F 301 THRU 12 F 319	12 G 301 THRU 12 G 319	5.28	2.76	12 F 301 THRU 12 F 325	12 G 301 THRU 12 G 325
	2.00	0.24	0.24	4.02	6.33	12 F 301 THRU 12 F 319	12 G 301 THRU 12 G 319	5.31	5.04	12 F 301 THRU 12 F 325	12 G 301 THRU 12 G 325
2.50	1.00	0.28	0.20	4.88	1.03	12 F 301 THRU 12 F 323	12 G 301 THRU 12 G 323	5.91	0.53	12 F 301 THRU 12 F 328	12 G 301 THRU 12 G 328
	1.50	0.28	0.22	4.91	3.31	12 F 301 THRU 12 F 323	12 G 301 THRU 12 G 323	6.48	1.74	12 F 301 THRU 12 F 331	12 G 301 THRU 12 G 331
	2.00	0.28	0.24	4.93	5.60	12 F 301 THRU 12 F 323	12 G 301 THRU 12 G 323	6.51	4.02	12 F 301 THRU 12 F 331	12 G 301 THRU 12 G 331
	2.50	0.28	0.26	4.95	7.89	12 F 301 THRU 12 F 323	12 G 301 THRU 12 G 323	6.55	6.29	12 F 301 THRU 12 F 331	12 G 301 THRU 12 G 331
3.00	1.00	0.32	0.20	5.80	0.30	12 F 301 THRU 12 F 328	12 G 301 THRU 12 G 328	6.10	1.54	12 F 301 THRU 12 F 329	12 G 301 THRU 12 G 329
	1.50	0.32	0.22	5.82	2.59	12 F 301 THRU 12 F 328	12 G 301 THRU 12 G 328	7.68	0.73	12 F 301 THRU 12 F 337	12 G 301 THRU 12 G 337
	2.00	0.32	0.24	5.84	4.88	12 F 301 THRU 12 F 328	12 G 301 THRU 12 G 328	7.71	3.01	12 F 301 THRU 12 F 337	12 G 301 THRU 12 G 337
	2.50	0.32	0.26	5.87	7.16	12 F 301 THRU 12 F 328	12 G 301 THRU 12 G 328	7.75	5.28	12 F 301 THRU 12 F 337	12 G 301 THRU 12 G 337
	3.00	0.32	0.28	5.89	9.44	12 F 301 THRU 12 F 328	12 G 301 THRU 12 G 328	7.78	7.55	12 F 301 THRU 12 F 337	12 G 301 THRU 12 G 337
3.50	1.00	0.36	0.20	6.28	0.43	12 F 301 THRU 12 F 330	12 G 301 THRU 12 G 330	6.28	2.56	12 F 301 THRU 12 F 330	12 G 301 THRU 12 G 330
	1.50	0.36	0.22	6.73	1.86	12 F 301 THRU 12 F 332	12 G 301 THRU 12 G 332	8.59	0.29	12 F 301 THRU 12 F 341	12 G 301 THRU 12 G 341
	2.00	0.36	0.24	6.75	4.15	12 F 301 THRU 12 F 332	12 G 301 THRU 12 G 332	8.91	1.99	12 F 301 THRU 12 F 343	12 G 301 THRU 12 G 343
	2.50	0.36	0.26	6.78	6.43	12 F 301 THRU 12 F 332	12 G 301 THRU 12 G 332	8.95	4.26	12 F 301 THRU 12 F 343	12 G 301 THRU 12 G 343
	3.00	0.36	0.28	6.80	8.72	12 F 301 THRU 12 F 333	12 G 301 THRU 12 G 333	8.98	6.54	12 F 301 THRU 12 F 343	12 G 301 THRU 12 G 343

SLOPE = 6 : 1

SKEW = 45 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	0.70	0.20	0.20	1.40	6.24	12 F 301 THRU 12 F	304	12 G 301 THRU 12 G	304	2.60	5.04	12 F 301 THRU 12 F	310	12 G 301 THRU 12 G	310
1.50	0.70	0.22	0.20	1.94	5.87	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.64	4.17	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
2.00	0.70	0.24	0.20	2.48	5.50	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	4.68	3.30	12 F 301 THRU 12 F	120	12 G 301 THRU 12 G	320
2.50	0.70	0.28	0.20	3.06	5.26	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312	5.76	2.56	12 F 301 THRU 12 F	126	12 G 301 THRU 12 G	326
3.00	0.70	0.32	0.20	3.64	5.01	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315	6.84	1.81	12 F 301 THRU 12 F	131	12 G 301 THRU 12 G	331
3.50	0.70	0.36	0.20	4.22	4.77	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	7.92	1.07	12 F 301 THRU 12 F	137	12 G 301 THRU 12 G	337

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	0.70	0.20	0.20	3.80	3.84	12 F 301 THRU 12 F	316	12 G 301 THRU 12 G	316	5.00	2.64	12 F 301 THRU 12 F	122	12 G 301 THRU 12 G	322
1.50	0.70	0.22	0.20	5.34	2.47	12 F 301 THRU 12 F	324	12 G 301 THRU 12 G	324	7.04	0.77	12 F 301 THRU 12 F	132	12 G 301 THRU 12 G	332
2.00	0.70	0.24	0.20	6.88	1.10	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331	7.98	1.10	12 F 301 THRU 12 F	137	12 G 301 THRU 12 G	337
2.50	0.70	0.28	0.20	8.32	0.14	12 F 301 THRU 12 F	339	12 G 301 THRU 12 G	339	8.32	2.84	12 F 301 THRU 12 F	139	12 G 301 THRU 12 G	339
3.00	0.70	0.32	0.20	8.65	1.39	12 F 301 THRU 12 F	340	12 G 301 THRU 12 G	340	8.65	4.59	12 F 301 THRU 12 F	140	12 G 301 THRU 12 G	340
3.50	0.70	0.36	0.20	8.99	2.63	12 F 301 THRU 12 F	342	12 G 301 THRU 12 G	342	8.99	6.33	12 F 301 THRU 12 F	142	12 G 301 THRU 12 G	342

SLOPE = 6 : 1

SKEW = 60 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	0.70	0.20	0.20	0.81	5.43	12 F 301 THRU 12 F	303	12 G 301 THRU 12 G	303	1.50	4.74	12 F 301 THRU 12 F	306	12 G 301 THRU 12 G	306
1.50	0.70	0.22	0.20	1.12	5.25	12 F 301 THRU 12 F	304	12 G 301 THRU 12 G	304	2.10	4.27	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309
2.00	0.70	0.24	0.20	1.43	5.08	12 F 301 THRU 12 F	306	12 G 301 THRU 12 G	306	2.70	3.81	12 F 301 THRU 12 F	312	12 G 301 THRU 12 G	312
2.50	0.70	0.28	0.20	1.77	5.02	12 F 301 THRU 12 F	307	12 G 301 THRU 12 G	307	3.33	3.46	12 F 301 THRU 12 F	315	12 G 301 THRU 12 G	315
3.00	0.70	0.32	0.20	2.10	4.97	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	3.95	3.12	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318
3.50	0.70	0.36	0.20	2.44	4.90	12 F 301 THRU 12 F	311	12 G 301 THRU 12 G	311	4.57	2.77	12 F 301 THRU 12 F	321	12 G 301 THRU 12 G	321

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	0.70	0.20	0.20	2.19	4.05	12 F 301 THRU 12 F	309	12 G 301 THRU 12 G	309	2.89	3.35	12 F 301 THRU 12 F	313	12 G 301 THRU 12 G	313
1.50	0.70	0.22	0.20	3.08	3.29	12 F 301 THRU 12 F	314	12 G 301 THRU 12 G	314	4.06	2.31	12 F 301 THRU 12 F	319	12 G 301 THRU 12 G	319
2.00	0.70	0.24	0.20	3.97	2.54	12 F 301 THRU 12 F	318	12 G 301 THRU 12 G	318	5.24	1.27	12 F 301 THRU 12 F	325	12 G 301 THRU 12 G	325
2.50	0.70	0.28	0.20	4.88	1.91	12 F 301 THRU 12 F	323	12 G 301 THRU 12 G	323	6.44	0.35	12 F 301 THRU 12 F	331	12 G 301 THRU 12 G	331
3.00	0.70	0.32	0.20	5.80	1.27	12 F 301 THRU 12 F	328	12 G 301 THRU 12 G	328	7.07	0.57	12 F 301 THRU 12 F	334	12 G 301 THRU 12 G	334
3.50	0.70	0.36	0.20	6.71	0.63	12 F 301 THRU 12 F	332	12 G 301 THRU 12 G	332	7.34	1.50	12 F 301 THRU 12 F	335	12 G 301 THRU 12 G	335

SCHEDULE OF BRACKET DIMENSIONS

FOR SKEW 90°

No.	Pipe Runner Size (cm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)
1	7.60 / 8.90	94.00	76.20	76.20	48.25	48.25	96.50	31.30	62.70	94.00
2	8.90 / 10.10	106.00	76.20	76.20	54.25	54.25	108.50	35.60	75.30	106.90
3	10.10 / 11.40	119.00	76.20	76.20	60.75	60.75	121.50	39.70	79.30	119.00
3	12.70 / 14.10	146.00	76.20	76.20	74.75	74.25	148.50	48.70	97.30	146.00
5	15.20 / 16.80	173.00	76.20	76.20	87.75	87.75	175.50	57.70	115.30	173.00

FOR SKEW 60°

No.	Pipe Runner Size (cm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)
1	7.60 / 8.90	107.80	116.70	50.80	35.90	71.90	110.30	35.90	71.00	107.80
2	8.90 / 10.10	121.60	124.60	50.80	40.50	81.10	124.10	40.50	81.10	121.60
3	10.10 / 11.40	136.60	133.00	50.80	45.50	91.10	139.14	45.50	91.10	136.60
3	12.70 / 14.10	167.80	151.30	50.80	55.90	119.90	170.30	55.90	111.90	167.80
5	15.20 / 16.80	198.90	169.20	50.80	66.30	132.60	201.40	66.30	132.60	198.90

FOR SKEW 45°

No.	Pipe Runner Size (cm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)
1	7.60 / 8.90	130.90	186.10	50.80	43.60	87.30	133.40	43.60	87.30	130.90
2	8.90 / 10.10	147.90	205.10	50.80	49.30	96.80	150.40	49.30	98.60	147.90
3	10.10 / 11.40	166.20	223.40	50.80	55.40	110.80	168.70	55.40	110.80	166.20
3	12.70 / 14.10	204.40	256.60	50.80	68.10	136.30	206.90	68.10	136.30	204.40
5	15.20 / 16.80	242.60	299.80	50.80	80.90	161.70	245.10	80.87	161.73	242.60

MAXIMUM "L" FOR GIVEN SIZES AND YIELD STRENGTH

YIELD		171 KSM ASTM A-53 TYPE ES ORB	FOR PIPE RUNNERS WITH 'C' ABOVE THE MAXIMUM 'C' FOR GIVEN SIZES ARE TO BE STRENTHENED OVER THE MID SPAN, AS FOLLOWS	
SIZE IN INCHES	SIZE IN CM.		LENGTH RANGE	SIZES OF PIPE AND ANGLE BARS
3.0" / 3.5"	7.60 / 8.90	3.4 m	Length 'C'> 3.4m < 4.7m	3" / 3.5" Pipe with L 2" x 2" x 3/8"
3.5" / 4.0"	8.90 / 10.10	4.7 m	Length 'C'> 4.7m < 6.3m	3.5" / 4" Pipe with L 2" x 2" x 3/8"
4.0" / 4.4"	10.10 / 11.40	6.3 m	Length 'C'> 6.3m < 10.8m	4" / 4.4" Pipe with L 2½" x 2½" x ½"
5.0" / 5.56"	12.70 / 14.10	10.8 m	Length 'C'> 10.8m < 15.2m	5" / 5.56" Pipe with L 3" x 3" x ½"
6.0" / 6.25"	15.20 / 16.80	15.2 m	Length 'C'> 15.2m < 19.2m	6" / 6.62" Pipe with L 3½" x 3½" x ½"

Consultant: ITAL CONSULT	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF AL BAHA - ABHA ROAD — Page of

Item: 50501 STRUCTURAL STEEL (Pipe Runner) — Drawing No..

RCBC @ Sta. 3+827.000
Skew = * 90 0
Span = * 3.00
No. of Cell = 1

Pipe Runner Size (cm.) = 8.90/10.10
Size of Angle Bars (inches) = 2.0x2.0x3/8
No. of Rows = 2

Location	Length (m.)	Level @ Top Surface of Top Slab	Level @ Top Surface of Apron Slab	Length of Pipe Runner (m.)	Length of Angle Bar Support (m.)
WING WALL INLET =	* 4.731	* 1495.715	* 1494.532	4.877	2.926
WING WALL OUTLET =	* 5.973	* 1495.292	* 1493.799	** 6.157	3.694
			TOTAL =	11.034	6.62
			TOTAL LENGTH ON EACH =	22.068	13.24
TOTAL WEIGHT IN KGS.(including plates, bolts & nuts) =				72.631	

Note:
* 1). Data to be changed.
** 2). The longer pipe runner will be the basis of taking all dimensions on the details.

ELEVATION

DETAIL "A"
(Plan @ Headwall)

DETAIL "A"
(Elevation @ Headwall)

For Normal

DETAIL "A"
(Plan @ Headwall)

DETAIL "A"
(Elevation @ Headwall)

For Skew

Consultant: ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor: M. A. AL SWAILEM CO.
Q.S. Res. Engr.		Q.S. Proj. Manager

Consultant: ITAL CONSULT	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF AL BAHA - ABHA ROAD — Page of

Item: 50501 STRUCTURAL STEEL (Pipe Runner) — Drawing No..

RCBC @ Sta. 4+108

Skew = 90 ^{0}

Span = * 3.00

No. of Cell = 1

Pipe Runner Size (cm.) = 8.90/10.10

Size of Angle Bars (inches) = 2.0x2.0x3/8

No. of Rows = 2

Location	Length (m.)	Level @ Top Surface of Top Slab	Level @ Top Surface of Apron Slab	Length of Pipe Runner (m.)	Length of Angle Bar Support (m.)
WING WALL INLET =	* 4.731	* 1494.205	* 1492.901	4.907	**2.944**
WING WALL OUTLET =	* 5.973	* 1494.488	* 1493.377	** 6.075	**3.645**
			TOTAL =	**10.982**	**6.589**
			TOTAL LENGTH ON EACH =	**21.964**	**13.178**
TOTAL WEIGHT IN KGS.(including plates, bolts & nuts) =				**72.291**	

FOR NORMAL		WEIGHTS (kgs)						
INNER Ø (m)	OUTER Ø (m)	PIPE RUNNER	ANGLE BAR	PLATE	BOLTS & NUTS	WEIGHT	No. of Rows	TOTAL WT.
0.089	0.101	30.875	5.006	0.139	0.126	36.146	2	72.291

ELEVATION

Note:

* 1). Data to be changed.

** 2). The longer pipe runner will be the basis of taking all dimensions on the details.

DETAIL "A"
(Plan @ Headwall)

DETAIL "A"
(Elevation @ Headwall)

For Normal

Consultant: ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor: M. A. AL SWAILEM CO.
Q.S. Res. Engr.		Q.S. Proj. Manager

Consultant: ITAL CONSULT	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project: TAIF AL BAHA - ABHA ROAD — Page of

Item: 50501 STRUCTURAL STEEL (Pipe Runner) — Drawing No..

RCBC @ Sta. 3+827.000

Skew = * 30 0

Span = * 3.00

No. of Cell = 1

Pipe Runner Size (cm.) = 8.90/10.10

Size of Angle Bars (inches) = 2.0x2.0x3/8

No. of Rows = 2

Location	Length (m.)	Level @ Top Surface of Top Slab	Level @ Top Surface of Apron Slab	Length of Pipe Runner (m.)	Length of Angle Bar Support (m.)
WING WALL INLET =	* 4.731	* 1495.715	* 1494.532	4.877	**2.926**
WING WALL OUTLET =	* 5.973	* 1495.292	* 1493.799	** 6.157	**3.694**
			TOTAL =	**11.034**	**6.62**
			TOTAL LENGTH ON EACH =	**22.068**	**13.24**
TOTAL WEIGHT IN KGS. (including plates, bolts & nuts) =				**72.952**	

FOR SKEW		WEIGHTS (kgs)						
INNER Ø (m)	OUTER Ø (m)	PIPE RUNNER	ANGLE BAR	PLATE	BOLTS & NUTS	WEIGHT	No. of Rows	TOTAL WT.
0.089	0.101	31.021	5.029	0.300	0.126	36.476	2	72.952

ELEVATION

Note:

* 1). Data to be changed.

** 2). The longer pipe runner will be the basis of taking all dimensions on the details.

DETAIL "A"
(Plan @ Headwall)

DETAIL "A"
(Elevation @ Headwall)

For Skew

Consultant: ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor: M. A. AL SWAILEM CO.
Q.S. Res. Engr.		Q.S. Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

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Project : TAIF AL BAHA - ABHA ROAD — Page: __1_ of _1_

Item : 50501 STRUCTURAL STEEL (PIPE RUNNER) — Drwg. No. _____

50501 STRUCTURAL STEEL (PIPE RUNNER)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
50501	STRUCTURAL STEEL (PIPE RUNNER)	TON	0.073	skew
		TON	0.072	normal
	Grand total	TON	0.145	

Suprv'g. Consultant : ITAL CONSULT	TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

R.C.B.C. INLET & OUTLET DETAILS

WW. SCH.

SLOPE = 6 : 1

SKEW = 60 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	0.70	0.20	0.20	0.81	5.43	12 F 101 THRU 12 F	103	12 G 101 THRU 12 G	103	1.50	4.74	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106
1.50	0.70	0.22	0.20	1.12	5.25	12 F 101 THRU 12 F	104	12 G 101 THRU 12 G	104	2.10	4.27	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109
2.00	0.70	0.24	0.20	1.43	5.08	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106	2.70	3.81	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
2.50	0.70	0.28	0.20	1.77	5.02	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.33	3.46	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
3.00	0.70	0.32	0.20	2.10	4.97	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.95	3.12	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
3.50	0.70	0.36	0.20	2.44	4.90	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.57	2.77	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	0.70	0.20	0.20	2.19	4.05	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	2.89	3.35	12 F 101 THRU 12 F	113	12 G 101 THRU 12 G	113
1.50	0.70	0.22	0.20	3.08	3.29	12 F 101 THRU 12 F	114	12 G 101 THRU 12 G	114	4.06	2.31	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
2.00	0.70	0.24	0.20	3.97	2.54	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	5.24	1.27	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
2.50	0.70	0.28	0.20	4.88	1.91	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	6.44	0.35	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
3.00	0.70	0.32	0.20	5.80	1.27	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	7.07	0.57	12 F 101 THRU 12 F	134	12 G 101 THRU 12 G	134
3.50	0.70	0.36	0.20	6.71	0.63	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	7.34	1.50	12 F 101 THRU 12 F	135	12 G 101 THRU 12 G	135

STANDARD RCBC INLET & OUTLET

SLOPE = 2 : 1 SKEW = 45 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL		BOT. SLAB	COMMON TO CELL 1 , 2 , 3 & 4						X1				X2
S	H	EXT W1	INT W2	T1	L1	L2	h1	C	-	-	1 CELL	2 CELL	3 CELL	4 CELL	
1.00	1.00	0.20	0.20	0.24	3.39	2.40	1.20	3.60			1.40	2.60	3.80	5.00	0.20
1.50	1.00	0.22	0.20	0.26	3.45	2.44	1.22	3.66			1.94	3.64	5.34	7.04	0.20
	1.50	0.22	0.22	0.26	4.86	3.44	1.72	5.16			1.94	3.66	5.38	7.10	0.22
2.00	1.00	0.24	0.20	0.28	3.51	2.48	1.24	3.72			2.48	4.68	6.88	9.08	0.20
	1.50	0.24	0.22	0.28	4.92	3.48	1.74	5.22			2.48	4.70	6.92	9.14	0.22
	2.00	0.24	0.24	0.28	6.34	4.48	2.24	6.72			2.48	4.72	6.96	9.20	0.24
2.50	1.00	0.28	0.20	0.32	3.62	2.56	1.28	3.84			3.06	5.76	8.46	11.16	0.24
	1.50	0.28	0.22	0.32	5.03	3.56	1.78	5.34			3.06	5.78	8.50	11.22	0.26
	2.00	0.28	0.24	0.32	6.45	4.56	2.28	6.84			3.06	5.80	8.54	11.28	0.27
	2.50	0.28	0.26	0.32	7.86	5.56	2.78	8.34			3.06	5.82	8.58	11.34	0.28
3.00	1.00	0.32	0.20	0.36	3.73	2.64	1.32	3.96			3.64	6.84	10.04	13.24	0.24
	1.50	0.32	0.22	0.36	5.15	3.64	1.82	5.46			3.64	6.86	10.08	13.30	0.26
	2.00	0.32	0.24	0.36	6.56	4.64	2.32	6.96			3.64	6.88	10.12	13.36	0.28
	2.50	0.32	0.26	0.36	7.98	5.64	2.82	8.46			3.64	6.90	10.16	13.42	0.29
	3.00	0.32	0.28	0.36	9.39	6.64	3.32	9.96			3.64	6.92	10.20	13.48	0.30
3.50	1.00	0.36	0.20	0.40	3.85	2.72	1.36	4.08			4.22	7.92	11.62	15.32	0.24
	1.50	0.36	0.22	0.40	5.26	3.72	1.86	5.58			4.22	7.94	11.66	15.38	0.26
	2.00	0.36	0.24	0.40	6.68	4.72	2.36	7.08			4.22	7.96	11.70	15.44	0.28
	2.50	0.36	0.26	0.40	8.09	5.72	2.86	8.58			4.22	7.98	11.74	15.50	0.29
	3.00	0.36	0.28	0.40	9.50	6.72	3.36	10.08			4.22	8.00	11.78	15.56	0.31

ROW OF GRATE PIPES

1-CELL		2-CELL		3-CELL		4-CELL	
NO.	SPACING	NO.	SPACING	NO.	SPACING	NO.	SPACING

NOTE:
INSTALLATION OF PIPE RUNNERS ON CULVERT ENDS ON A 2:1 SLOPE ARE NOT REQUIRED. HOWEVER, IT IS TO BE SHIELDED WITH BARRIER IF WITHIN THE CLEAR ZONE AND ALSO IF IT IS OVER 2.00 METERS IN HEIGHT.

NUMBER AND SPACING OF VARIABLE BARS

	OUTER WALL			INNER WALL	
	VERTICAL BARS		HORIZONTAL BARS	VERTICAL BARS	HORIZONTAL BARS
S	NEAR FACE (N.F.)	FAR FACE (F.F.)	NEAR F. AND FAR F.	BOTH SIDES	BOTH SIDES
1.00	14 B 101 THRU 14 B 123	12 C 101 THRU 12C 123	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 123	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 123	12 C 101 THRU 12C 123	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 123	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 132	12 C 101 THRU 12C 132	12 A 101 THRU 12A 110	14 D 101 THRU 14 D 132	12 E 101 THRU 12 E 110
2.00	14 B 101 THRU 14 B 123	12 C 101 THRU 12C 123	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 123	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 133	12 C 101 THRU 12C 133	12 A 101 THRU 12A 110	14 D 101 THRU 14 D 133	12 E 101 THRU 12 E 110
	14 B101 THRU 14 B137, 18 B101 THRU 18 B105	12 C 101 THRU 12C 142	12 A 101 THRU 12A 114	14 D101 THRU 14 D137, 16 D101 THRU 16 D105	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 124	12 C 101 THRU 12C 124	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 124	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 134	12 C 101 THRU 12C 134	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 134	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B137, 18 B101 THRU 18 B106	12 C 101 THRU 12C 143	12 A 101 THRU 12A 114	14 D101 THRU 14 D137, 16 D101 THRU 16 D106	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B137, 18 B101 THRU 18 B115	12 C 101 THRU 12C 152	12 A 101 THRU 12A 117	14 D101 THRU 14 D137, 16 D101 THRU 16 D115	12 E 101 THRU 12 E 117
3.00	14 B 101 THRU 14 B 125	12 C 101 THRU 12C 125	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 125	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 134	12 C 101 THRU 12C 134	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 134	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B137, 18 B101 THRU 18 B107	12 C 101 THRU 12C 144	12 A 101 THRU 12A 114	14 D101 THRU 14 D137, 16 D101 THRU 16 D107	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B137, 18 B101 THRU 18 B116	12 C 101 THRU 12C 153	12 A 101 THRU 12A 117	14 D101 THRU 14 D137, 16 D101 THRU 16 D116	12 E 101 THRU 12 E 117
	14B101 THRU 14B137, 18B101 THRU 18 B120, 20B101 THRU 20 B106	12 C 101 THRU 12C 163	12 A 101 THRU 12A 121	14 D101 THRU 14 D137, 16 D101 THRU 16 D126	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 126	12 C 101 THRU 12C 126	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 126	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 135	12 C 101 THRU 12C 135	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 135	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B137, 18 B101 THRU 18 B108	12 C 101 THRU 12C 145	12 A 101 THRU 12A 114	14 D101 THRU 14 D137, 16 D101 THRU 16 D108	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B137, 18 B101 THRU 18 B117	12 C 101 THRU 12C 154	12 A 101 THRU 12A 118	14 D101 THRU 14 D137, 16 D101 THRU 16 D117	12 E 101 THRU 12 E 118
	14B101 THRU 14B137, 18B101 THRU 18 B120, 20B101 THRU 20 B106	12 C 101 THRU 12C 163	12 A 101 THRU 12A 121	14 D101 THRU 14 D137, 16 D101 THRU 16 D126	12 E 101 THRU 12 E 121

STANDARD RCBC INLET & OUTLET

SLOPE = 2 : 1 SKEW = 60 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL EXT	WALL INT	BOT. SLAB	COMMON TO CELL 1, 2, 3 & 4						X1 1 CELL	X1 2 CELL	X1 3 CELL	X1 4 CELL	X2
S	H	W1	W2	T1	L1	L2	h1	C	-	-					
1.00	1.00	0.20	0.20	0.24	2.77	2.40	1.20	3.02			1.40	2.60	3.80	5.00	0.20
1.50	1.00	0.22	0.20	0.26	2.82	2.44	1.22	3.07			1.94	3.64	5.34	7.04	0.20
	1.50	0.22	0.22	0.26	3.97	3.44	1.72	4.33			1.94	3.66	5.38	7.10	0.22
2.00	1.00	0.24	0.20	0.28	2.86	2.48	1.24	3.12			2.48	4.68	6.88	9.08	0.20
	1.50	0.24	0.22	0.28	4.02	3.48	1.74	4.38			2.48	4.70	6.92	9.14	0.22
	2.00	0.24	0.24	0.28	5.17	4.48	2.24	5.63			2.48	4.72	6.96	9.20	0.24
2.50	1.00	0.28	0.20	0.32	2.96	2.56	1.28	3.22			3.06	5.76	8.46	11.16	0.24
	1.50	0.28	0.22	0.32	4.11	3.56	1.78	4.48			3.06	5.78	8.50	11.22	0.26
	2.00	0.28	0.24	0.32	5.27	4.56	2.28	5.74			3.06	5.80	8.54	11.28	0.27
	2.50	0.28	0.26	0.32	6.42	5.56	2.78	7.00			3.06	5.82	8.58	11.34	0.28
3.00	1.00	0.32	0.20	0.36	3.05	2.64	1.32	3.32			3.64	6.84	10.04	13.24	0.24
	1.50	0.32	0.22	0.36	4.20	3.64	1.82	4.58			3.64	6.86	10.08	13.30	0.26
	2.00	0.32	0.24	0.36	5.36	4.64	2.32	5.84			3.64	6.88	10.12	13.36	0.28
	2.50	0.32	0.26	0.36	6.51	5.64	2.82	7.09			3.64	6.90	10.16	13.42	0.29
	3.00	0.32	0.28	0.36	7.67	6.64	3.32	8.36			3.64	6.92	10.20	13.48	0.30
3.50	1.00	0.36	0.20	0.40	3.14	2.72	1.36	3.42			4.22	7.92	11.62	15.32	0.24
	1.50	0.36	0.22	0.40	4.30	3.72	1.86	4.69			4.22	7.94	11.66	15.38	0.26
	2.00	0.36	0.24	0.40	5.45	4.72	2.36	5.94			4.22	7.96	11.70	15.44	0.28
	2.50	0.36	0.26	0.40	6.60	5.72	2.86	7.19			4.22	7.98	11.74	15.50	0.29
	3.00	0.36	0.28	0.40	7.76	6.72	3.36	8.46			4.22	8.00	11.78	15.56	0.31

ROW OF GRATE PIPES

S	1-CELL NO.	1-CELL SPACING	2-CELL NO.	2-CELL SPACING	3-CELL NO.	3-CELL SPACING	4-CELL NO.	4-CELL SPACING
1.00								
1.50								
2.00								
2.50								
3.00								
3.50								

NOTE:
INSTALLATION OF PIPE RUNNERS ON CULVERT ENDS ON A 2:1 SLOPE ARE NOT REQUIRED. HOWEVER, IT IS TO BE SHIELDED WITH BARRIER IF WITHIN THE CLEAR ZONE AND ALSO IF IT IS OVER 2.00 METERS IN HEIGHT.

NUMBER AND SPACING OF VARIABLE BARS

S	OUTER WALL VERTICAL BARS NEAR FACE (N.F.)	OUTER WALL VERTICAL BARS FAR FACE (F.F.)	OUTER WALL HORIZONTAL BARS NEAR F. AND FAR F.	INNER WALL VERTICAL BARS BOTH SIDES	INNER WALL HORIZONTAL BARS BOTH SIDES
1.00	14 B 101 THRU 14 B 118	12 C 101 THRU 12C 118	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 118	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 119	12 C 101 THRU 12C 119	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 119	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 126	12 C 101 THRU 12C 126	12 A 101 THRU 12A 110	14 D 101 THRU 14 D 126	12 E 101 THRU 12 E 110
2.00	14 B 101 THRU 14 B 119	12 C 101 THRU 12C 119	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 119	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 127	12 C 101 THRU 12C 127	12 A 101 THRU 12A 110	14 D 101 THRU 14 D 127	12 E 101 THRU 12 E 110
	14 B101 THRU 14 B131, 18 B101 THRU 18 B103	12 C 101 THRU 12C 134	12 A 101 THRU 12A 114	14 D101 THRU 14 D131, 16 D101 THRU 16 D103	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 120	12 C 101 THRU 12C 120	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 120	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 127	12 C 101 THRU 12C 127	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 127	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B131, 18 B101 THRU 18 B104	12 C 101 THRU 12C 135	12 A 101 THRU 12A 114	14 D101 THRU 14 D131, 16 D101 THRU 16 D104	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B131, 18 B101 THRU 18 B112	12 C 101 THRU 12C 143	12 A 101 THRU 12A 117	14 D101 THRU 14 D131, 16 D101 THRU 16 D112	12 E 101 THRU 12 E 117
3.00	14 B 101 THRU 14 B 120	12 C 101 THRU 12C 120	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 120	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 128	12 C 101 THRU 12C 128	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 128	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B131, 18 B101 THRU 18 B105	12 C 101 THRU 12C 136	12 A 101 THRU 12A 114	14 D101 THRU 14 D131, 16 D101 THRU 16 D105	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B131, 18 B101 THRU 18 B112	12 C 101 THRU 12C 143	12 A 101 THRU 12A 117	14 D101 THRU 14 D131, 16 D101 THRU 16 D112	12 E 101 THRU 12 E 117
	14B101 THRU 14B131, 18B101 THRU 18 B114, 20B101 THRU 20 B106	12 C 101 THRU 12C 151	12 A 101 THRU 12A 121	14 D101 THRU 14 D131, 16 D101 THRU 16 D120	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 121	12 C 101 THRU 12C 121	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 121	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 129	12 C 101 THRU 12C 129	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 129	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B131, 18 B101 THRU 18 B108	12 C 101 THRU 12C 136	12 A 101 THRU 12A 114	14 D101 THRU 14 D131, 16 D101 THRU 16 D108	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B131, 18 B101 THRU 18 B113	12 C 101 THRU 12C 144	12 A 101 THRU 12A 118	14 D101 THRU 14 D131, 16 D101 THRU 16 D113	12 E 101 THRU 12 E 118
	14B101 THRU 14B131, 18B101 THRU 18 B114, 20B101 THRU 20 B107	12 C 101 THRU 12C 152	12 A 101 THRU 12A 121	14 D101 THRU 14 D131, 16 D101 THRU 16 D121	12 E 101 THRU 12 E 121

STANDARD RCBC INLET & OUTLET

SLOPE = 2 : 1 SKEW = 90 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL EXT	WALL INT	BOT. SLAB	COMMON TO CELL 1, 2, 3 & 4						X1 1 CELL	X1 2 CELL	X1 3 CELL	X1 4 CELL	X2
S	H	W1	W2	T1	L1	L2	h1	C	-	-					
1.00	1.00	0.20	0.20	0.24	2.40	2.40	1.20	2.68			1.40	2.60	3.80	5.00	0.20
1.50	1.00	0.22	0.20	0.26	2.44	2.44	1.22	2.73			1.94	3.64	5.34	7.04	0.20
	1.50	0.22	0.22	0.26	3.44	3.44	1.72	3.85			1.94	3.66	5.38	7.10	0.22
2.00	1.00	0.24	0.20	0.28	2.48	2.48	1.24	2.77			2.48	4.68	6.88	9.08	0.20
	1.50	0.24	0.22	0.28	3.48	3.48	1.74	3.89			2.48	4.70	6.92	9.14	0.22
	2.00	0.24	0.24	0.28	4.48	4.48	2.24	5.01			2.48	4.72	6.96	9.20	0.24
2.50	1.00	0.28	0.20	0.32	2.56	2.56	1.28	2.86			3.06	5.76	8.46	11.16	0.24
	1.50	0.28	0.22	0.32	3.56	3.56	1.78	3.98			3.06	5.78	8.50	11.22	0.26
	2.00	0.28	0.24	0.32	4.56	4.56	2.28	5.10			3.06	5.80	8.54	11.28	0.27
	2.50	0.28	0.26	0.32	5.56	5.56	2.78	6.22			3.06	5.82	8.58	11.34	0.28
3.00	1.00	0.32	0.20	0.36	2.64	2.64	1.32	2.95			3.64	6.84	10.04	13.24	0.24
	1.50	0.32	0.22	0.36	3.64	3.64	1.82	4.07			3.64	6.86	10.08	13.30	0.26
	2.00	0.32	0.24	0.36	4.64	4.64	2.32	5.19			3.64	6.88	10.12	13.36	0.28
	2.50	0.32	0.26	0.36	5.64	5.64	2.82	6.31			3.64	6.90	10.16	13.42	0.29
	3.00	0.32	0.28	0.36	6.64	6.64	3.32	7.42			3.64	6.92	10.20	13.48	0.30
3.50	1.00	0.36	0.20	0.40	2.72	2.72	1.36	3.04			4.22	7.92	11.62	15.32	0.24
	1.50	0.36	0.22	0.40	3.72	3.72	1.86	4.16			4.22	7.94	11.66	15.38	0.26
	2.00	0.36	0.24	0.40	4.72	4.72	2.36	5.28			4.22	7.96	11.70	15.44	0.28
	2.50	0.36	0.26	0.40	5.72	5.72	2.86	6.40			4.22	7.98	11.74	15.50	0.29
	3.00	0.36	0.28	0.40	6.72	6.72	3.36	7.51			4.22	8.00	11.78	15.56	0.31

ROW OF GRATE PIPES

1-CELL NO.	1-CELL SPACING	2-CELL NO.	2-CELL SPACING	3-CELL NO.	3-CELL SPACING	4-CELL NO.	4-CELL SPACING

NOTE:
INSTALLATION OF PIPE RUNNERS ON CULVERT ENDS ON A 2:1 SLOPE ARE NOT REQUIRED. HOWEVER, IT IS TO BE SHIELDED WITH BARRIER IF WITHIN THE CLEAR ZONE AND ALSO IF IT IS OVER 2.00 METERS IN HEIGHT.

NUMBER AND SPACING OF VARIABLE BARS

	OUTER WALL			INNER WALL	
	VERTICAL BARS		HORIZONTAL BARS	VERTICAL BARS	HORIZONTAL BARS
S	NEAR FACE (N.F.)	FAR FACE (F.F.)	NEAR F. AND FAR F.	BOTH SIDES	BOTH SIDES
1.00	14 B 101 THRU 14 B 116	12 C 101 THRU 12C 116	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 116	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 116	12 C 101 THRU 12C 116	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 116	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 123	12 C 101 THRU 12C 123	12 A 101 THRU 12A 110	14 D 101 THRU 14 D 123	12 E 101 THRU 12 E 110
2.00	14 B 101 THRU 14 B 117	12 C 101 THRU 12C 117	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 117	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 123	12 C 101 THRU 12C 123	12 A 101 THRU 12A 110	14 D 101 THRU 14 D 123	12 E 101 THRU 12 E 110
	14 B101 THRU 14 B126, 18 B101 THRU 18 B103	12 C 101 THRU 12C 130	12 A 101 THRU 12A 114	14 D 101 THRU 14 D 130	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 117	12 C 101 THRU 12C 117	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 117	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 124	12 C 101 THRU 12C 124	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 124	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B126, 18 B101 THRU 18 B103	12 C 101 THRU 12C 130	12 A 101 THRU 12A 114	14 D101 THRU 14 D126, 16 D101 THRU 16 D103	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B126, 18 B101 THRU 18 B111	12 C 101 THRU 12C 137	12 A 101 THRU 12A 117	14 D101 THRU 14 D126, 16 D101 THRU 16 D111	12 E 101 THRU 12 E 117
3.00	14 B 101 THRU 14 B 118	12 C 101 THRU 12C 118	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 118	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 124	12 C 101 THRU 12C 124	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 124	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B126, 18 B101 THRU 18 B106	12 C 101 THRU 12C 131	12 A 101 THRU 12A 114	14 D101 THRU 14 D126, 16 D101 THRU 16 D106	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B126, 18 B101 THRU 18 B112	12 C 101 THRU 12C 138	12 A 101 THRU 12A 117	14 D101 THRU 14 D126, 16 D101 THRU 16 D112	12 E 101 THRU 12 E 117
	14B101 THRU 14B126, 18B101 THRU 18 B112, 20B101 THRU 20 B106	12 C 101 THRU 12C 144	12 A 101 THRU 12A 121	14 D101 THRU 14 D126, 16 D101 THRU 16 D118	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 118	12 C 101 THRU 12C 118	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 118	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 125	12 C 101 THRU 12C 125	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 125	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B126, 18 B101 THRU 18 B106	12 C 101 THRU 12C 131	12 A 101 THRU 12A 114	14 D101 THRU 14 D126, 16 D101 THRU 16 D106	12 E 101 THRU 12 E 114
	14 B101 THRU 14 B126, 18 B101 THRU 18 B112	12 C 101 THRU 12C 138	12 A 101 THRU 12A 118	14 D101 THRU 14 D126, 16 D101 THRU 16 D112	12 E 101 THRU 12 E 118
	14B101 THRU 14B126, 18B101 THRU 18 B112, 20B101 THRU 20 B107	12 C 101 THRU 12C 145	12 A 101 THRU 12A 121	14 D101 THRU 14 D126, 16 D101 THRU 16 D119	12 E 101 THRU 12 E 121

SLOPE = 2 : 1

SKEW = 45 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT				DIMENSION		REINFORCEMENT			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	1.40	1.99	12 F 101 THRU 12 F	105	12 G 101 THRU 12 G	105	2.60	0.79	12 F 101 THRU 12 F	113	12 G 101 THRU 12 G	113
1.50	1.00	0.22	0.20	1.94	1.51	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.45	0.19	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
	1.50	0.22	0.22	1.94	2.92	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.66	1.20	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
2.00	1.00	0.24	0.20	2.48	1.03	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	3.51	1.17	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
	1.50	0.24	0.22	2.48	2.44	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	4.70	0.22	12 F 101 THRU 12 F	127	12 G 101 THRU 12 G	127
	2.00	0.24	0.24	2.48	3.86	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	4.72	1.62	12 F 101 THRU 12 F	127	12 G 101 THRU 12 G	127
2.50	1.00	0.28	0.20	3.06	0.56	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116	3.62	2.14	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
	1.50	0.28	0.22	3.06	1.97	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116	5.03	0.75	12 F 101 THRU 12 F	129	12 G 101 THRU 12 G	129
	2.00	0.28	0.24	3.06	3.39	14 F 101 THRU 14 F	116	12 G 101 THRU 12 G	116	5.80	0.65	12 F 101 THRU 12 F	134	12 G 101 THRU 12 G	134
	2.50	0.28	0.26	3.06	4.80	14 F 101 THRU 14 F	116	12 G 101 THRU 12 G	116	5.82	2.04	12 F 101 THRU 12 F	134	12 G 101 THRU 12 G	134
3.00	1.00	0.32	0.20	3.64	0.09	14 F 101 THRU 14 F	120	12 G 101 THRU 12 G	120	3.73	3.11	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	1.50	0.32	0.22	3.64	1.51	14 F 101 THRU 14 F	120	12 G 101 THRU 12 G	120	5.15	1.71	12 F 101 THRU 12 F	130	12 G 101 THRU 12 G	130
	2.00	0.32	0.24	3.64	2.92	14 F 101 THRU 14 F	120	12 G 101 THRU 12 G	120	6.56	0.32	12 F 101 THRU 12 F	139	12 G 101 THRU 12 G	139
	2.50	0.32	0.26	3.64	4.34	14 F 101 THRU 14 F	120	12 G 101 THRU 12 G	120	6.90	1.08	14 F 101 THRU 14 F	142	12 G 101 THRU 12 G	142
	3.00	0.32	0.28	3.64	5.75	16 F 101 THRU 16 F	120	12 G 101 THRU 12 G	120	6.92	2.47	14 F 101 THRU 14 F	142	12 G 101 THRU 12 G	142
3.50	1.00	0.36	0.20	3.85	0.37	16 F 101 THRU 16 F	121	12 G 101 THRU 12 G	121	3.85	4.07	14 F 101 THRU 14 F	121	12 G 101 THRU 12 G	121
	1.50	0.36	0.22	4.22	1.04	16 F 101 THRU 16 F	124	12 G 101 THRU 12 G	124	5.26	2.68	14 F 101 THRU 14 F	131	12 G 101 THRU 12 G	131
	2.00	0.36	0.24	4.22	2.46	16 F 101 THRU 16 F	124	12 G 101 THRU 12 G	124	6.68	1.28	14 F 101 THRU 14 F	140	12 G 101 THRU 12 G	140
	2.50	0.36	0.26	4.22	3.87	16 F 101 THRU 16 F	124	12 G 101 THRU 12 G	124	7.98	0.11	14 F 101 THRU 14 F	149	12 G 101 THRU 12 G	149
	3.00	0.36	0.28	4.22	5.28	16 F 101 THRU 16 F	124	12 G 101 THRU 12 G	124	8.00	1.50	14 F 101 THRU 14 F	149	12 G 101 THRU 12 G	149

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT				DIMENSION		REINFORCEMENT			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	3.39	0.41	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	3.39	1.61	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
1.50	1.00	0.22	0.20	3.45	1.89	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119	3.45	3.59	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
	1.50	0.22	0.22	4.86	0.52	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	4.86	2.24	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128
2.00	1.00	0.24	0.20	3.51	3.37	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119	3.51	5.57	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
	1.50	0.24	0.22	4.92	2.00	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	4.92	4.22	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128
	2.00	0.24	0.24	6.34	0.62	12 F 101 THRU 12 F	138	12 G 101 THRU 12 G	138	6.34	2.86	12 F 101 THRU 12 F	138	12 G 101 THRU 12 G	138
2.50	1.00	0.28	0.20	3.62	4.84	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120	3.62	7.54	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
	1.50	0.28	0.22	5.03	3.47	12 F 101 THRU 12 F	129	12 G 101 THRU 12 G	129	5.03	6.19	12 F 101 THRU 12 F	129	12 G 101 THRU 12 G	129
	2.00	0.28	0.24	6.45	2.09	12 F 101 THRU 12 F	139	12 G 101 THRU 12 G	139	6.45	4.83	12 F 101 THRU 12 F	139	12 G 101 THRU 12 G	139
	2.50	0.28	0.26	7.86	0.72	12 F 101 THRU 12 F	148	12 G 101 THRU 12 G	148	7.86	3.48	12 F 101 THRU 12 F	148	12 G 101 THRU 12 G	148
3.00	1.00	0.32	0.20	3.73	6.31	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121	3.73	9.51	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	1.50	0.32	0.22	5.15	4.93	12 F 101 THRU 12 F	130	12 G 101 THRU 12 G	130	5.15	8.15	12 F 101 THRU 12 F	130	12 G 101 THRU 12 G	130
	2.00	0.32	0.24	6.56	3.56	12 F 101 THRU 12 F	139	12 G 101 THRU 12 G	139	6.56	6.80	14 F 101 THRU 14 F	139	12 G 101 THRU 12 G	139
	2.50	0.32	0.26	7.98	2.18	14 F 101 THRU 14 F	149	12 G 101 THRU 12 G	149	7.98	5.44	14 F 101 THRU 14 F	149	12 G 101 THRU 12 G	149
	3.00	0.32	0.28	9.39	0.81	14 F 101 THRU 14 F	158	12 G 101 THRU 12 G	158	9.39	4.09	14 F 101 THRU 14 F	158	12 G 101 THRU 12 G	158
3.50	1.00	0.36	0.20	3.85	7.77	14 F 101 THRU 14 F	121	12 G 101 THRU 12 G	121	3.85	11.47	14 F 101 THRU 14 F	121	14 G 101 THRU 14 G	121
	1.50	0.36	0.22	5.26	6.40	14 F 101 THRU 14 F	131	12 G 101 THRU 12 G	131	5.26	10.12	14 F 101 THRU 14 F	131	14 G 101 THRU 14 G	131
	2.00	0.36	0.24	6.68	5.02	14 F 101 THRU 14 F	140	12 G 101 THRU 12 G	140	6.68	8.76	14 F 101 THRU 14 F	140	14 G 101 THRU 14 G	140
	2.50	0.36	0.26	8.09	3.65	14 F 101 THRU 14 F	150	12 G 101 THRU 12 G	150	8.09	7.41	14 F 101 THRU 14 F	150	14 G 101 THRU 14 G	150
	3.00	0.36	0.28	9.50	2.28	14 F 101 THRU 14 F	159	12 G 101 THRU 12 G	159	9.50	6.06	14 F 101 THRU 14 F	159	14 G 101 THRU 14 G	159

SLOPE = 2 : 1

SKEW = 60 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT				DIMENSION		REINFORCEMENT			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	0.81	1.96	12 F 101 THRU 12 F	103	12 G 101 THRU 12 G	103	1.50	1.27	12 F 101 THRU 12 F	108	12 G 101 THRU 12 G	108
1.50	1.00	0.22	0.20	1.12	1.70	12 F 101 THRU 12 F	105	12 G 101 THRU 12 G	105	2.10	0.72	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
	1.50	0.22	0.22	1.12	2.85	12 F 101 THRU 12 F	105	12 G 101 THRU 12 G	105	2.11	1.86	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
2.00	1.00	0.24	0.20	1.43	1.43	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	2.70	0.16	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116
	1.50	0.24	0.22	1.43	2.59	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	2.71	1.31	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116
	2.00	0.24	0.24	1.43	3.74	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	2.73	2.44	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116
2.50	1.00	0.28	0.20	1.77	1.19	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	2.96	0.37	12 F 101 THRU 12 F	117	12 G 101 THRU 12 G	117
	1.50	0.28	0.22	1.77	2.34	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.34	0.77	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
	2.00	0.28	0.24	1.77	3.50	14 F 101 THRU 14 F	109	12 G 101 THRU 12 G	109	3.35	1.92	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
	2.50	0.28	0.26	1.77	4.65	14 F 101 THRU 14 F	109	12 G 101 THRU 12 G	109	3.36	3.06	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
3.00	1.00	0.32	0.20	2.10	0.95	14 F 101 THRU 14 F	112	12 G 101 THRU 12 G	112	3.05	0.90	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	1.50	0.32	0.22	2.10	2.10	14 F 101 THRU 14 F	112	12 G 101 THRU 12 G	112	3.96	0.24	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124
	2.00	0.32	0.24	2.10	3.26	14 F 101 THRU 14 F	112	12 G 101 THRU 12 G	112	3.97	1.39	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124
	2.50	0.32	0.26	2.10	4.41	14 F 101 THRU 14 F	112	12 G 101 THRU 12 G	112	3.98	2.53	14 F 101 THRU 14 F	124	12 G 101 THRU 12 G	124
	3.00	0.32	0.28	2.10	5.57	16 F 101 THRU 16 F	112	12 G 101 THRU 12 G	112	4.00	3.67	14 F 101 THRU 14 F	124	12 G 101 THRU 12 G	124
3.50	1.00	0.36	0.20	2.44	0.70	16 F 101 THRU 16 F	114	12 G 101 THRU 12 G	114	3.14	1.43	14 F 101 THRU 14 F	119	12 G 101 THRU 12 G	119
	1.50	0.36	0.22	2.44	1.86	16 F 101 THRU 16 F	114	12 G 101 THRU 12 G	114	4.30	0.28	14 F 101 THRU 14 F	126	12 G 101 THRU 12 G	126
	2.00	0.36	0.24	2.44	3.01	16 F 101 THRU 16 F	114	12 G 101 THRU 12 G	114	4.60	0.85	14 F 101 THRU 14 F	128	12 G 101 THRU 12 G	128
	2.50	0.36	0.26	2.44	4.16	16 F 101 THRU 16 F	114	12 G 101 THRU 12 G	114	4.61	1.99	14 F 101 THRU 14 F	128	12 G 101 THRU 12 G	128
	3.00	0.36	0.28	2.44	5.32	16 F 101 THRU 16 F	114	12 G 101 THRU 12 G	114	4.62	3.14	14 F 101 THRU 14 F	128	12 G 101 THRU 12 G	128

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT				DIMENSION		REINFORCEMENT			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	2.19	0.58	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	2.77	0.12	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116
1.50	1.00	0.22	0.20	2.82	0.26	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116	2.82	1.24	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116
	1.50	0.22	0.22	3.11	0.86	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	3.97	0.13	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124
2.00	1.00	0.24	0.20	2.86	1.11	12 F 101 THRU 12 F	117	12 G 101 THRU 12 G	117	2.86	2.38	12 F 101 THRU 12 F	117	12 G 101 THRU 12 G	117
	1.50	0.24	0.22	4.00	0.02	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124	4.02	1.26	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124
	2.00	0.24	0.24	4.02	1.15	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124	5.17	0.14	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132
2.50	1.00	0.28	0.20	2.96	1.92	12 F 101 THRU 12 F	117	12 G 101 THRU 12 G	117	2.96	3.48	12 F 101 THRU 12 F	117	12 G 101 THRU 12 G	117
	1.50	0.28	0.22	4.11	0.80	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125	4.11	2.37	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
	2.00	0.28	0.24	4.93	0.34	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131	5.27	1.24	12 F 101 THRU 12 F	133	12 G 101 THRU 12 G	133
	2.50	0.28	0.26	4.95	1.47	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131	6.42	0.13	12 F 101 THRU 12 F	140	12 G 101 THRU 12 G	140
3.00	1.00	0.32	0.20	3.05	2.75	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	3.05	4.59	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	1.50	0.32	0.22	4.20	1.62	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126	4.20	3.48	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
	2.00	0.32	0.24	5.36	0.48	12 F 101 THRU 12 F	133	12 G 101 THRU 12 G	133	5.36	2.35	14 F 101 THRU 14 F	133	12 G 101 THRU 12 G	133
	2.50	0.32	0.26	5.87	0.64	14 F 101 THRU 14 F	137	12 G 101 THRU 12 G	137	6.51	1.24	14 F 101 THRU 14 F	141	12 G 101 THRU 12 G	141
	3.00	0.32	0.28	5.89	1.78	14 F 101 THRU 14 F	137	12 G 101 THRU 12 G	137	7.67	0.11	14 F 101 THRU 14 F	149	12 G 101 THRU 12 G	149
3.50	1.00	0.36	0.20	3.14	3.57	14 F 101 THRU 14 F	119	12 G 101 THRU 12 G	119	3.14	5.70	14 F 101 THRU 14 F	119	14 G 101 THRU 14 G	119
	1.50	0.36	0.22	4.30	2.43	14 F 101 THRU 14 F	126	12 G 101 THRU 12 G	126	4.30	4.58	14 F 101 THRU 14 F	126	14 G 101 THRU 14 G	126
	2.00	0.36	0.24	5.45	1.30	14 F 101 THRU 14 F	134	12 G 101 THRU 12 G	134	5.45	3.46	14 F 101 THRU 14 F	134	14 G 101 THRU 14 G	134
	2.50	0.36	0.26	6.60	0.18	14 F 101 THRU 14 F	142	12 G 101 THRU 12 G	142	6.60	2.35	14 F 101 THRU 14 F	142	14 G 101 THRU 14 G	142
	3.00	0.36	0.28	6.80	0.96	14 F 101 THRU 14 F	143	12 G 101 THRU 12 G	143	7.76	1.22	14 F 101 THRU 14 F	149	14 G 101 THRU 14 G	149

STANDARD RCBC INLET & OUTLET

SLOPE = 3 : 1 SKEW = 45 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET																ROW OF GRATE PIPES							
R.C.B.C.		WALL		BOT.	COMMON TO CELL						X1				X2	1-CELL		2-CELL		3-CELL		4-CELL	
CELL		EXT	INT	SLAB	1 , 2 , 3 & 4						1	2	3	4									
S	H	W1	W2	T1	L1	L2	h1	C	-	-	CELL	CELL	CELL	CELL		NO.	SPACING	NO.	SPACING	NO.	SPACING	NO.	SPACING
1.00	1.00	0.20	0.20	0.24	5.09	3.60	1.20	5.23			1.40	2.60	3.80	5.00	0.20								
1.50	1.00	0.22	0.20	0.26	5.18	3.66	1.22	5.32			1.94	3.64	5.34	7.04	0.20	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
	1.50	0.22	0.22	0.26	7.30	5.16	1.72	7.50			1.94	3.66	5.38	7.10	0.22	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	1.00	0.24	0.20	0.28	5.26	3.72	1.24	5.40			2.48	4.68	6.88	9.08	0.20	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 0.75
	1.50	0.24	0.22	0.28	7.38	5.22	1.74	7.58			2.48	4.70	6.92	9.14	0.22	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	2.00	0.24	0.24	0.28	9.50	6.72	2.24	9.76			2.48	4.72	6.96	9.20	0.24	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	1.00	0.28	0.20	0.32	5.43	3.84	1.28	5.58			3.06	5.76	8.46	11.16	0.24	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	1.50	0.28	0.22	0.32	7.55	5.34	1.78	7.76			3.06	5.78	8.50	11.22	0.26	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.00	0.28	0.24	0.32	9.67	6.84	2.28	9.94			3.06	5.80	8.54	11.28	0.27	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.50	0.28	0.26	0.32	11.79	8.34	2.78	12.11			3.06	5.82	8.58	11.34	0.28	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	1.00	0.32	0.20	0.36	5.60	3.96	1.32	5.75			3.64	6.84	10.04	13.24	0.24	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	1.50	0.32	0.22	0.36	7.72	5.46	1.82	7.93			3.64	6.86	10.08	13.30	0.26	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.00	0.32	0.24	0.36	9.84	6.96	2.32	10.11			3.64	6.88	10.12	13.36	0.28	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.50	0.32	0.26	0.36	11.96	8.46	2.82	12.29			3.64	6.90	10.16	13.42	0.29	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	3.00	0.32	0.28	0.36	14.09	9.96	3.32	14.48			3.64	6.92	10.20	13.48	0.30	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	1.00	0.36	0.20	0.40	5.77	4.08	1.36	5.93			4.22	7.92	11.62	15.32	0.24	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	1.50	0.36	0.22	0.40	7.89	5.58	1.86	8.11			4.22	7.94	11.66	15.38	0.26	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.00	0.36	0.24	0.40	10.01	7.08	2.36	10.28			4.22	7.96	11.70	15.44	0.28	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.50	0.36	0.26	0.40	12.13	8.58	2.86	12.46			4.22	7.98	11.74	15.50	0.29	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	3.00	0.36	0.28	0.40	14.26	10.08	3.36	14.65			4.22	8.00	11.78	15.56	0.31	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

	OUTER WALL			INNER WALL	
	VERTICAL BARS		HORIZONTAL BARS	VERTICAL BARS	HORIZONTAL BARS
S	NEAR FACE (N.F.)	FAR FACE (F.F.)	NEAR F. AND FAR F.	BOTH SIDES	BOTH SIDES
1.00	14 B 101 THRU 14 B 134	12 C 101 THRU 12C 134	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 134	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 135	12 C 101 THRU 12C 135	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 135	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 149	12 C 101 THRU 12C 149	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 149	12 E 101 THRU 12 E 111
2.00	14 B 101 THRU 14 B 135	12 C 101 THRU 12C 135	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 135	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 149	12 C 101 THRU 12C 149	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 149	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B151, 18 B101 THRU 18 B113	12 C 101 THRU 12C 163	12 A 101 THRU 12A 114	14 D101 THRU 14 D157, 16 D101 THRU 16 D107	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 136	12 C 101 THRU 12C 136	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 136	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 150	12 C 101 THRU 12C 150	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 150	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B151, 18 B101 THRU 18 B113	12 C 101 THRU 12C 164	12 A 101 THRU 12A 115	14 D101 THRU 14 D157, 16 D101 THRU 16 D107	12 E 101 THRU 12 E 115
	14B101 THRU 14B151, 18B101 THRU 18 B120, 20B101 THRU 20 B108	12 C 101 THRU 12C 179	12 A 101 THRU 12A 118	14 D101 THRU 14 D157, 16 D101 THRU 16 D122	12 E 101 THRU 12 E 118
3.00	14 B 101 THRU 14 B 137	12 C 101 THRU 12C 137	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 137	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 151	12 C 101 THRU 12C 151	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 151	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B151, 18 B101 THRU 18 B115	12 C 101 THRU 12C 166	12 A 101 THRU 12A 115	14 D101 THRU 14 D157, 16 D101 THRU 16 D109	12 E 101 THRU 12 E 115
	14B101 THRU 14B151, 18B101 THRU 18 B120, 20B101 THRU 20 B109	12 C 101 THRU 12C 180	12 A 101 THRU 12A 118	14 D101 THRU 14 D157, 16 D101 THRU 16 D123	12 E 101 THRU 12 E 118
	14B101 THRU 14B151, 18B101 THRU 18 B120, 20B101 THRU 20 B123	12 C 101 THRU 12C 194	12 A 101 THRU 12A 121	14 D101 THRU 14 D157, 16 D101 THRU 16 D137	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 138	12 C 101 THRU 12C 138	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 138	12 E 101 THRU 12 E 108
	14 B101 THRU 14 B151, 18 B101 THRU 18 B102	12 C 101 THRU 12C 153	12 A 101 THRU 12A 112	14 D 101 THRU 14 D 153	12 E 101 THRU 12 E 112
	14 B101 THRU 14 B151, 18 B101 THRU 18 B116	12 C 101 THRU 12C 167	12 A 101 THRU 12A 115	14 D101 THRU 14 D157, 16 D101 THRU 16 D110	12 E 101 THRU 12 E 115
	14B101 THRU 14B151, 18B101 THRU 18 B120, 20B101 THRU 20 B110	12 C 101 THRU 12C 181	12 A 101 THRU 12A 118	14 D101 THRU 14 D157, 16 D101 THRU 16 D124	12 E 101 THRU 12 E 118
	14B101 THRU 14B151, 18B101 THRU 18 B120, 20B101 THRU 20 B124	12 C 101 THRU 12C 195	12 A 101 THRU 12A 122	14 D101 THRU 14 D157, 16 D101 THRU 16 D138	12 E 101 THRU 12 E 122

STANDARD RCBC INLET & OUTLET

SLOPE = 3 : 1 SKEW = 60 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET																ROW OF GRATE PIPES									
R.C.B.C.		WALL		BOT.	COMMON TO CELL						X1				X2	1-CELL		2-CELL		3-CELL		4-CELL	
CELL		EXT	INT	SLAB	1 , 2 , 3 & 4						1	2	3	4									
S	H	W1	W2	T1	L1	L2	h1	C	-	-	CELL	CELL	CELL	CELL		NO.	SPACING	NO.	SPACING	NO.	SPACING	NO.	SPACING
1.00	1.00	0.20	0.20	0.24	4.16	3.60	1.20	4.33			1.40	2.60	3.80	5.00	0.20								
1.50	1.00	0.22	0.20	0.26	4.23	3.66	1.22	4.40			1.94	3.64	5.34	7.04	0.20	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
	1.50	0.22	0.22	0.26	5.96	5.16	1.72	6.20			1.94	3.66	5.38	7.10	0.22	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	1.00	0.24	0.20	0.28	4.30	3.72	1.24	4.48			2.48	4.68	6.88	9.08	0.20	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	1.50	0.24	0.22	0.28	6.03	5.22	1.74	6.28			2.48	4.70	6.92	9.14	0.22	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	2.00	0.24	0.24	0.28	7.76	6.72	2.24	8.08			2.48	4.72	6.96	9.20	0.24	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	1.00	0.28	0.20	0.32	4.43	3.84	1.28	4.61			3.06	5.76	8.46	11.16	0.24	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	1.50	0.28	0.22	0.32	6.17	5.34	1.78	6.42			3.06	5.78	8.50	11.22	0.26	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.00	0.28	0.24	0.32	7.90	6.84	2.28	8.22			3.06	5.80	8.54	11.28	0.27	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.50	0.28	0.26	0.32	9.63	8.34	2.78	10.02			3.06	5.82	8.58	11.34	0.28	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	1.00	0.32	0.20	0.36	4.57	3.96	1.32	4.76			3.64	6.84	10.04	13.24	0.24	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	1.50	0.32	0.22	0.36	6.30	5.46	1.82	6.56			3.64	6.86	10.08	13.30	0.26	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.00	0.32	0.24	0.36	8.04	6.96	2.32	8.37			3.64	6.88	10.12	13.36	0.28	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.50	0.32	0.26	0.36	9.77	8.46	2.82	10.17			3.64	6.90	10.16	13.42	0.29	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	3.00	0.32	0.28	0.36	11.50	9.96	3.32	11.97			3.64	6.92	10.20	13.48	0.30	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	1.00	0.36	0.20	0.40	4.71	4.08	1.36	4.90			4.22	7.92	11.62	15.32	0.24	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	1.50	0.36	0.22	0.40	6.44	5.58	1.86	6.70			4.22	7.94	11.66	15.38	0.26	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.00	0.36	0.24	0.40	8.18	7.08	2.36	8.51			4.22	7.96	11.70	15.44	0.28	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.50	0.36	0.26	0.40	9.91	8.58	2.86	10.31			4.22	7.98	11.74	15.50	0.29	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	3.00	0.36	0.28	0.40	11.64	10.08	3.36	12.12			4.22	8.00	11.78	15.56	0.31	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

	OUTER WALL			INNER WALL	
	VERTICAL BARS		HORIZONTAL BARS	VERTICAL BARS	HORIZONTAL BARS
S	NEAR FACE (N.F.)	FAR FACE (F.F.)	NEAR F. AND FAR F.	BOTH SIDES	BOTH SIDES
1.00	14 B 101 THRU 14 B 128	12 C 101 THRU 12C 128	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 128	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 128	12 C 101 THRU 12C 128	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 128	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 140	12 C 101 THRU 12C 140	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 140	12 E 101 THRU 12 E 111
2.00	14 B 101 THRU 14 B 129	12 C 101 THRU 12C 129	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 129	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 140	12 C 101 THRU 12C 140	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 140	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B146, 18 B101 THRU 18 B106	12 C 101 THRU 12C 152	12 A 101 THRU 12A 114	14 D101 THRU 14 D146, 16 D101 THRU 16 D106	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 130	12 C 101 THRU 12C 130	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 130	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 141	12 C 101 THRU 12C 141	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 141	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B146, 18 B101 THRU 18 B107	12 C 101 THRU 12C 153	12 A 101 THRU 12A 115	14 D101 THRU 14 D146, 16 D101 THRU 16 D107	12 E 101 THRU 12 E 115
	14B101 THRU 14B146, 18B101 THRU 18 B112, 20B101 THRU 20 B106	12 C 101 THRU 12C 164	12 A 101 THRU 12A 118	14 D101 THRU 14 D146, 16 D101 THRU 16 D118	12 E 101 THRU 12 E 118
3.00	14 B 101 THRU 14 B 130	12 C 101 THRU 12C 130	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 130	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 142	12 C 101 THRU 12C 142	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 142	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B146, 18 B101 THRU 18 B108	12 C 101 THRU 12C 154	12 A 101 THRU 12A 115	14 D101 THRU 14 D146, 16 D101 THRU 16 D108	12 E 101 THRU 12 E 115
	14B101 THRU 14B146, 18B101 THRU 18 B110	12 C 101 THRU 12C 165	12 A 101 THRU 12A 118	14 D101 THRU 14 D146, 16 D101 THRU 16 D110	12 E 101 THRU 12 E 118
	14B101 THRU 14B146, 18B101 THRU 18 B112, 20B101 THRU 20 B119	12 C 101 THRU 12C 177	12 A 101 THRU 12A 121	14 D101 THRU 14 D146, 16 D101 THRU 16 D131	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 131	12 C 101 THRU 12C 131	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 131	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 143	12 C 101 THRU 12C 143	12 A 101 THRU 12A 112	14 D 101 THRU 14 D 143	12 E 101 THRU 12 E 112
	14 B101 THRU 14 B146, 18 B101 THRU 18 B109	12 C 101 THRU 12C 155	12 A 101 THRU 12A 115	14 D101 THRU 14 D146, 16 D101 THRU 16 D109	12 E 101 THRU 12 E 115
	14B101 THRU 14B146, 18B101 THRU 18 B120, 20B101 THRU 20 B108	12 C 101 THRU 12C 166	12 A 101 THRU 12A 118	14 D101 THRU 14 D146, 16 D101 THRU 16 D121	12 E 101 THRU 12 E 118
	14B101 THRU 14B146, 18B101 THRU 18 B112, 20B101 THRU 20 B120	12 C 101 THRU 12C 178	12 A 101 THRU 12A 122	14 D101 THRU 14 D146, 16 D101 THRU 16 D132	12 E 101 THRU 12 E 122

STANDARD RCBC INLET & OUTLET

SLOPE = 3 : 1 SKEW = 90 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL		BOT.	COMMON TO CELL						X1				X2
		EXT	INT	SLAB	1 , 2 , 3 & 4						1	2	3	4	
S	H	W1	W2	T1	L1	L2	h1	C	-	-	CELL	CELL	CELL	CELL	
1.00	1.00	0.20	0.20	0.24	3.60	3.60	1.20	3.79			1.40	2.60	3.80	5.00	0.20
1.50	1.00	0.22	0.20	0.26	3.66	3.66	1.22	3.86			1.94	3.64	5.34	7.04	0.20
	1.50	0.22	0.22	0.26	5.16	5.16	1.72	5.44			1.94	3.66	5.38	7.10	0.22
2.00	1.00	0.24	0.20	0.28	3.72	3.72	1.24	3.92			2.48	4.68	6.88	9.08	0.20
	1.50	0.24	0.22	0.28	5.22	5.22	1.74	5.50			2.48	4.70	6.92	9.14	0.22
	2.00	0.24	0.24	0.28	6.72	6.72	2.24	7.08			2.48	4.72	6.96	9.20	0.24
2.50	1.00	0.28	0.20	0.32	3.84	3.84	1.28	4.05			3.06	5.76	8.46	11.16	0.24
	1.50	0.28	0.22	0.32	5.34	5.34	1.78	5.63			3.06	5.78	8.50	11.22	0.26
	2.00	0.28	0.24	0.32	6.84	6.84	2.28	7.21			3.06	5.80	8.54	11.28	0.27
	2.50	0.28	0.26	0.32	8.34	8.34	2.78	8.79			3.06	5.82	8.58	11.34	0.28
3.00	1.00	0.32	0.20	0.36	3.96	3.96	1.32	4.17			3.64	6.84	10.04	13.24	0.24
	1.50	0.32	0.22	0.36	5.46	5.46	1.82	5.76			3.64	6.86	10.08	13.30	0.26
	2.00	0.32	0.24	0.36	6.96	6.96	2.32	7.34			3.64	6.88	10.12	13.36	0.28
	2.50	0.32	0.26	0.36	8.46	8.46	2.82	8.92			3.64	6.90	10.16	13.42	0.29
	3.00	0.32	0.28	0.36	9.96	9.96	3.32	10.50			3.64	6.92	10.20	13.48	0.30
3.50	1.00	0.36	0.20	0.40	4.08	4.08	1.36	4.30			4.22	7.92	11.62	15.32	0.24
	1.50	0.36	0.22	0.40	5.58	5.58	1.86	5.88			4.22	7.94	11.66	15.38	0.26
	2.00	0.36	0.24	0.40	7.08	7.08	2.36	7.46			4.22	7.96	11.70	15.44	0.28
	2.50	0.36	0.26	0.40	8.58	8.58	2.86	9.04			4.22	7.98	11.74	15.50	0.29
	3.00	0.36	0.28	0.40	10.08	10.08	3.36	10.63			4.22	8.00	11.78	15.56	0.31

ROW OF GRATE PIPES

S	H	1-CELL NO.	1-CELL SPACING	2-CELL NO.	2-CELL SPACING	3-CELL NO.	3-CELL SPACING	4-CELL NO.	4-CELL SPACING
1.00	1.00								
1.50	1.00	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
	1.50	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	1.00	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	1.50	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	2.00	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	1.00	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	1.50	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.00	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.50	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	1.00	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	1.50	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.00	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.50	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	3.00	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	1.00	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	1.50	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.00	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.50	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	3.00	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

	OUTER WALL			INNER WALL	
	VERTICAL BARS		HORIZONTAL BARS	VERTICAL BARS	HORIZONTAL BARS
S	NEAR FACE (N.F.)	FAR FACE (F.F.)	NEAR F. AND FAR F.	BOTH SIDES	BOTH SIDES
1.00	14 B 101 THRU 14 B 124	12 C 101 THRU 12C 124	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 124	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 124	12 C 101 THRU 12C 124	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 124	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 134	12 C 101 THRU 12C 134	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 134	12 E 101 THRU 12 E 111
2.00	14 B 101 THRU 14 B 125	12 C 101 THRU 12C 125	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 125	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 135	12 C 101 THRU 12C 135	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 135	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B140, 18 B101 THRU 18 B104	12 C 101 THRU 12C 145	12 A 101 THRU 12A 114	14 D101 THRU 14 D140, 16 D101 THRU 16 D104	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 126	12 C 101 THRU 12C 126	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 126	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 136	12 C 101 THRU 12C 136	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 136	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B140, 18 B101 THRU 18 B106	12 C 101 THRU 12C 146	12 A 101 THRU 12A 115	14 D101 THRU 14 D140, 16 D101 THRU 16 D106	12 E 101 THRU 12 E 115
	14B101 THRU 14B140, 18B101 THRU 18 B116	12 C 101 THRU 12C 156	12 A 101 THRU 12A 118	14 D101 THRU 14 D140, 16 D101 THRU 16 D116	12 E 101 THRU 12 E 118
3.00	14 B 101 THRU 14 B 126	12 C 101 THRU 12C 126	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 126	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 136	12 C 101 THRU 12C 136	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 136	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B140, 18 B101 THRU 18 B107	12 C 101 THRU 12C 146	12 A 101 THRU 12A 115	14 D101 THRU 14 D140, 16 D101 THRU 16 D107	12 E 101 THRU 12 E 115
	14B101 THRU 14B140, 18B101 THRU 18 B116	12 C 101 THRU 12C 156	12 A 101 THRU 12A 118	14 D101 THRU 14 D140, 16 D101 THRU 16 D116	12 E 101 THRU 12 E 118
	14B101 THRU 14B140, 18B101 THRU 18 B121, 20B101 THRU 20 B105	12 C 101 THRU 12C 166	12 A 101 THRU 12A 121	14 D101 THRU 14 D140, 16 D101 THRU 16 D126	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 127	12 C 101 THRU 12C 127	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 127	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 137	12 C 101 THRU 12C 137	12 A 101 THRU 12A 112	14 D 101 THRU 14 D 137	12 E 101 THRU 12 E 112
	14 B101 THRU 14 B140, 18 B101 THRU 18 B107	12 C 101 THRU 12C 147	12 A 101 THRU 12A 115	14 D101 THRU 14 D140, 16 D101 THRU 16 D107	12 E 101 THRU 12 E 115
	14B101 THRU 14B140, 18B101 THRU 18 B117	12 C 101 THRU 12C 157	12 A 101 THRU 12A 118	14 D101 THRU 14 D140, 16 D101 THRU 16 D117	12 E 101 THRU 12 E 118
	14B101 THRU 14B140, 18B101 THRU 18 B121, 20B101 THRU 20 B107	12 C 101 THRU 12C 167	12 A 101 THRU 12A 122	14 D101 THRU 14 D140, 16 D101 THRU 16 D127	12 E 101 THRU 12 E 122

SLOPE = 3 : 1

SKEW = 45 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	1.40	3.69	12 F 101 THRU 12 F	104	12 G 101 THRU 12 G	104	2.60	2.49	12 F 101 THRU 12 F	110	12 G 101 THRU 12 G	110
1.50	1.00	0.22	0.20	1.94	3.24	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.64	1.54	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
	1.50	0.22	0.22	1.94	5.36	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.66	3.64	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
2.00	1.00	0.24	0.20	2.48	2.78	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.68	0.58	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
	1.50	0.24	0.22	2.48	4.90	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.70	2.68	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	2.00	0.24	0.24	2.48	7.02	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.72	4.78	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
2.50	1.00	0.28	0.20	3.06	2.37	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.43	0.33	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124
	1.50	0.28	0.22	3.06	4.49	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.78	1.77	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
	2.00	0.28	0.24	3.06	6.61	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.80	3.87	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
	2.50	0.28	0.26	3.06	8.73	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.82	5.97	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
3.00	1.00	0.32	0.20	3.64	1.96	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	5.60	1.24	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
	1.50	0.32	0.22	3.64	4.08	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.86	0.86	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	2.00	0.32	0.24	3.64	6.20	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.88	2.96	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	2.50	0.32	0.26	3.64	8.32	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.90	5.06	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132
	3.00	0.32	0.28	3.64	10.45	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.92	7.17	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132
3.50	1.00	0.36	0.20	4.22	1.55	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	5.77	2.15	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
	1.50	0.36	0.22	4.22	3.67	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	7.89	0.05	12 F 101 THRU 12 F	136	12 G 101 THRU 12 G	136
	2.00	0.36	0.24	4.22	5.79	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	7.96	2.05	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	2.50	0.36	0.26	4.22	7.91	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	7.98	4.15	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	3.00	0.36	0.28	4.22	10.04	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	8.00	6.26	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	3.80	1.29	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116	5.00	0.09	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122
1.50	1.00	0.22	0.20	5.18	0.16	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	5.18	1.86	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123
	1.50	0.22	0.22	5.38	1.92	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124	7.10	0.20	12 F 101 THRU 12 F	133	12 G 101 THRU 12 G	133
2.00	1.00	0.24	0.20	5.26	1.62	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	5.26	3.82	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123
	1.50	0.24	0.22	6.92	0.46	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	7.38	1.76	12 F 101 THRU 12 F	134	12 G 101 THRU 12 G	134
	2.00	0.24	0.24	6.96	2.54	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	9.20	0.30	12 F 101 THRU 12 F	143	12 G 101 THRU 12 G	143
2.50	1.00	0.28	0.20	5.43	3.03	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124	5.43	5.73	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124
	1.50	0.28	0.22	7.55	0.95	12 F 101 THRU 12 F	135	12 G 101 THRU 12 G	135	7.55	3.67	12 F 101 THRU 12 F	135	12 G 101 THRU 12 G	135
	2.00	0.28	0.24	8.54	1.13	12 F 101 THRU 12 F	140	12 G 101 THRU 12 G	140	9.67	1.61	12 F 101 THRU 12 F	145	12 G 101 THRU 12 G	145
	2.50	0.28	0.26	8.58	3.21	12 F 101 THRU 12 F	140	12 G 101 THRU 12 G	140	11.34	0.45	12 F 101 THRU 12 F	154	12 G 101 THRU 12 G	154
3.00	1.00	0.32	0.20	5.60	4.44	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125	5.60	7.64	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
	1.50	0.32	0.22	7.72	2.36	12 F 101 THRU 12 F	136	12 G 101 THRU 12 G	136	7.72	5.58	12 F 101 THRU 12 F	136	12 G 101 THRU 12 G	136
	2.00	0.32	0.24	9.84	0.28	12 F 101 THRU 12 F	146	12 G 101 THRU 12 G	146	9.84	3.52	12 F 101 THRU 12 F	146	12 G 101 THRU 12 G	146
	2.50	0.32	0.26	10.16	1.80	12 F 101 THRU 12 F	148	12 G 101 THRU 12 G	148	11.96	1.46	12 F 101 THRU 12 F	157	12 G 101 THRU 12 G	157
	3.00	0.32	0.28	10.20	3.89	12 F 101 THRU 12 F	148	12 G 101 THRU 12 G	148	13.48	0.61	12 F 101 THRU 12 F	164	12 G 101 THRU 12 G	164
3.50	1.00	0.36	0.20	5.77	5.85	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126	5.77	9.55	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
	1.50	0.36	0.22	7.89	3.77	12 F 101 THRU 12 F	136	12 G 101 THRU 12 G	136	7.89	7.49	12 F 101 THRU 12 F	136	12 G 101 THRU 12 G	136
	2.00	0.36	0.24	10.01	1.69	12 F 101 THRU 12 F	147	12 G 101 THRU 12 G	147	10.01	5.43	12 F 101 THRU 12 F	147	12 G 101 THRU 12 G	147
	2.50	0.36	0.26	11.74	0.39	12 F 101 THRU 12 F	156	12 G 101 THRU 12 G	156	12.13	3.37	12 F 101 THRU 12 F	158	12 G 101 THRU 12 G	158
	3.00	0.36	0.28	11.78	2.48	12 F 101 THRU 12 F	156	12 G 101 THRU 12 G	156	14.26	1.30	12 F 101 THRU 12 F	168	12 G 101 THRU 12 G	168

SLOPE = 3 : 1

SKEW = 60 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	0.81	3.35	12 F 101 THRU 12 F	103	12 G 101 THRU 12 G	103	1.50	2.66	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106
1.50	1.00	0.22	0.20	1.12	3.11	12 F 101 THRU 12 F	104	12 G 101 THRU 12 G	104	2.10	2.13	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109
	1.50	0.22	0.22	1.12	4.84	12 F 101 THRU 12 F	104	12 G 101 THRU 12 G	104	2.11	3.85	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109
2.00	1.00	0.24	0.20	1.43	2.87	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106	2.70	1.60	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
	1.50	0.24	0.22	1.43	4.60	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106	2.71	3.32	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
	2.00	0.24	0.24	1.43	6.33	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106	2.73	5.03	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
2.50	1.00	0.28	0.20	1.77	2.66	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.33	1.10	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
	1.50	0.28	0.22	1.77	4.40	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.34	2.83	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
	2.00	0.28	0.24	1.77	6.13	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.35	4.55	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
	2.50	0.28	0.26	1.77	7.86	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.36	6.27	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
3.00	1.00	0.32	0.20	2.10	2.47	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.95	0.62	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	1.50	0.32	0.22	2.10	4.20	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.96	2.34	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	2.00	0.32	0.24	2.10	5.94	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.97	4.07	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	2.50	0.32	0.26	2.10	7.67	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.98	5.79	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	3.00	0.32	0.28	2.10	9.40	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.00	7.50	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
3.50	1.00	0.36	0.20	2.44	2.27	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.57	0.14	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	1.50	0.36	0.22	2.44	4.00	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.58	1.86	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	2.00	0.36	0.24	2.44	5.74	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.60	3.58	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122
	2.50	0.36	0.26	2.44	7.47	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.61	5.30	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122
	3.00	0.36	0.28	2.44	9.20	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.62	7.02	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	2.19	1.97	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	2.89	1.27	12 F 101 THRU 12 F	113	12 G 101 THRU 12 G	113
1.50	1.00	0.22	0.20	3.08	1.15	12 F 101 THRU 12 F	114	12 G 101 THRU 12 G	114	4.06	0.17	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
	1.50	0.22	0.22	3.11	2.85	12 F 101 THRU 12 F	114	12 G 101 THRU 12 G	114	4.10	1.86	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
2.00	1.00	0.24	0.20	3.97	0.33	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	4.30	0.94	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
	1.50	0.24	0.22	4.00	2.03	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119	5.28	0.75	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
	2.00	0.24	0.24	4.02	3.74	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119	5.31	2.45	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
2.50	1.00	0.28	0.20	4.43	0.45	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121	4.43	2.01	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	1.50	0.28	0.22	4.91	1.26	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	6.17	0.31	12 F 101 THRU 12 F	129	12 G 101 THRU 12 G	129
	2.00	0.28	0.24	4.93	2.97	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	6.51	1.39	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	2.50	0.28	0.26	4.95	4.68	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	6.55	3.08	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
3.00	1.00	0.32	0.20	4.57	1.23	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121	4.57	3.07	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	1.50	0.32	0.22	5.82	0.48	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	6.30	1.38	12 F 101 THRU 12 F	130	12 G 101 THRU 12 G	130
	2.00	0.32	0.24	5.84	2.20	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	7.71	0.33	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	2.50	0.32	0.26	5.87	3.90	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	7.75	2.02	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	3.00	0.32	0.28	5.89	5.61	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	7.78	3.72	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
3.50	1.00	0.36	0.20	4.71	2.00	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122	4.71	4.13	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122
	1.50	0.36	0.22	6.44	0.29	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131	6.44	2.44	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	2.00	0.36	0.24	6.75	1.43	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	8.18	0.73	12 F 101 THRU 12 F	139	12 G 101 THRU 12 G	139
	2.50	0.36	0.26	6.78	3.13	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	8.95	0.96	12 F 101 THRU 12 F	143	12 G 101 THRU 12 G	143
	3.00	0.36	0.28	6.80	4.84	12 F 101 THRU 12 F	133	12 G 101 THRU 12 G	133	8.98	2.66	12 F 101 THRU 12 F	143	12 G 101 THRU 12 G	143

STANDARD RCBC INLET & OUTLET

SLOPE = 4 : 1 SKEW = 45 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL		BOT. SLAB	COMMON TO CELL 1, 2, 3 & 4						X1				X2	ROW OF GRATE PIPES 1-CELL		2-CELL		3-CELL		4-CELL	
		EXT	INT								1	2	3	4									
S	H	W1	W2	T1	L1	L2	h1	C	-	-	CELL	CELL	CELL	CELL		NO.	SPACING	NO.	SPACING	NO.	SPACING	NO.	SPACING
1.00	1.00	0.20	0.20	0.24	6.79	4.80	1.20	6.90			1.40	2.60	3.80	5.00	0.20								
1.50	1.00	0.22	0.20	0.26	6.90	4.88	1.22	7.01			1.94	3.64	5.34	7.04	0.20	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
	1.50	0.22	0.22	0.26	9.73	6.88	1.72	9.88			1.94	3.66	5.38	7.10	0.22	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	1.00	0.24	0.20	0.28	7.01	4.96	1.24	7.12			2.48	4.68	6.88	9.08	0.20	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	1.50	0.24	0.22	0.28	9.84	6.96	1.74	9.99			2.48	4.70	6.92	9.14	0.22	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	2.00	0.24	0.24	0.28	12.67	8.96	2.24	12.87			2.48	4.72	6.96	9.20	0.24	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	1.00	0.28	0.20	0.32	7.24	5.12	1.28	7.35			3.06	5.76	8.46	11.16	0.24	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	1.50	0.28	0.22	0.32	10.07	7.12	1.78	10.23			3.06	5.78	8.50	11.22	0.26	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.00	0.28	0.24	0.32	12.90	9.12	2.28	13.10			3.06	5.80	8.54	11.28	0.27	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.50	0.28	0.26	0.32	15.73	11.12	2.78	15.97			3.06	5.82	8.58	11.34	0.28	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	1.00	0.32	0.20	0.36	7.47	5.28	1.32	7.59			3.64	6.84	10.04	13.24	0.24	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	1.50	0.32	0.22	0.36	10.30	7.28	1.82	10.46			3.64	6.86	10.08	13.30	0.26	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.00	0.32	0.24	0.36	13.12	9.28	2.32	13.32			3.64	6.88	10.12	13.36	0.28	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.50	0.32	0.26	0.36	15.95	11.28	2.82	16.20			3.64	6.90	10.16	13.42	0.29	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	3.00	0.32	0.28	0.36	18.78	13.28	3.32	19.07			3.64	6.92	10.20	13.48	0.30	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	1.00	0.36	0.20	0.40	7.69	5.44	1.36	7.81			4.22	7.92	11.62	15.32	0.24	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	1.50	0.36	0.22	0.40	10.52	7.44	1.86	10.68			4.22	7.94	11.66	15.38	0.26	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.00	0.36	0.24	0.40	13.35	9.44	2.36	13.56			4.22	7.96	11.70	15.44	0.28	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.50	0.36	0.26	0.40	16.18	11.44	2.86	16.43			4.22	7.98	11.74	15.50	0.29	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	3.00	0.36	0.28	0.40	19.01	13.44	3.36	19.30			4.22	8.00	11.78	15.56	0.31	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

	OUTER WALL			INNER WALL	
	VERTICAL BARS		HORIZONTAL BARS	VERTICAL BARS	HORIZONTAL BARS
S	NEAR FACE (N.F.)	FAR FACE (F.F.)	NEAR F. AND FAR F.	BOTH SIDES	BOTH SIDES
1.00	14 B 101 THRU 14 B 145	12 C 101 THRU 12C 145	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 145	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 146	12 C 101 THRU 12C 146	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 146	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 165	12 C 101 THRU 12C 165	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 165	12 E 101 THRU 12 E 111
2.00	14 B 101 THRU 14 B 147	12 C 101 THRU 12C 147	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 147	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 165	12 C 101 THRU 12C 166	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 166	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B175, 18 B101 THRU 18 B109	12 C 101 THRU 12C 184	12 A 101 THRU 12A 114	14 D101 THRU 14 D176, 16 D101 THRU 16 D108	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 148	12 C 101 THRU 12C 148	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 148	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 167	12 C 101 THRU 12C 167	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 167	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B175, 18 B101 THRU 18 B111	12 C 101 THRU 12C 186	12 A 101 THRU 12A 115	14 D101 THRU 14 D176, 16 D101 THRU 16 D110	12 E 101 THRU 12 E 115
	14B101 THRU 14B175, 18B101 THRU 18 B129	12 C 101 THRU 12C 205	12 A 101 THRU 12A 118	14 D101 THRU 14 D176, 16 D101 THRU 16 D129	12 E 101 THRU 12 E 118
3.00	14 B 101 THRU 14 B 150	12 C 101 THRU 12C 150	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 150	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 169	12 C 101 THRU 12C 169	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 169	12 E 101 THRU 12 E 111
	14 B101 THRU 14 B175, 18 B101 THRU 18 B112	12 C 101 THRU 12C 187	12 A 101 THRU 12A 115	14 D101 THRU 14 D176, 16 D101 THRU 16 D111	12 E 101 THRU 12 E 115
	14B101 THRU 14B175, 18B101 THRU 18 B131	12 C 101 THRU 12C 206	12 A 101 THRU 12A 118	14 D101 THRU 14 D176, 16 D101 THRU 16 D130	12 E 101 THRU 12 E 118
	14B101 THRU 14B175, 18B101 THRU 18 B137, 20B101 THRU 20 B113	12 C 101 THRU 12C 225	12 A 101 THRU 12A 121	14 D101 THRU 14 D176, 16 D101 THRU 16 D149	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 151	12 C 101 THRU 12C 151	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 151	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 170	12 C 101 THRU 12C 170	12 A 101 THRU 12A 112	14 D 101 THRU 14 D 170	12 E 101 THRU 12 E 112
	14 B101 THRU 14 B175, 18 B101 THRU 18 B114	12 C 101 THRU 12C 189	12 A 101 THRU 12A 115	14 D101 THRU 14 D176, 16 D101 THRU 16 D113	12 E 101 THRU 12 E 115
	14B101 THRU 14B175, 18B101 THRU 18 B133	12 C 101 THRU 12C 208	12 A 101 THRU 12A 118	14 D101 THRU 14 D176, 16 D101 THRU 16 D132	12 E 101 THRU 12 E 118
	14B101 THRU 14B175, 18B101 THRU 18 B137, 20B101 THRU 20 B115	12 C 101 THRU 12C 227	12 A 101 THRU 12A 122	14 D101 THRU 14 D176, 16 D101 THRU 16 D151	12 E 101 THRU 12 E 122

STANDARD RCBC INLET & OUTLET

SLOPE = 4 : 1 SKEW = 60 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL		BOT.	COMMON TO CELL						X1				X2	ROW OF GRATE PIPES							
		EXT	INT	SLAB	1 , 2 , 3 & 4						1	2	3	4		1-CELL		2-CELL		3-CELL		4-CELL	
S	H	W1	W2	T1	L1	L2	h1	C	-	-	CELL	CELL	CELL	CELL		NO.	SPACING	NO.	SPACING	NO.	SPACING	NO.	SPACING
1.00	1.00	0.20	0.20	0.24	5.54	4.80	1.20	5.67			1.40	2.60	3.80	5.00	0.20								
1.50	1.00	0.22	0.20	0.26	5.63	4.88	1.22	5.76			1.94	3.64	5.34	7.04	0.20	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
	1.50	0.22	0.22	0.26	7.94	6.88	1.72	8.12			1.94	3.66	5.38	7.10	0.22	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	1.00	0.24	0.20	0.28	5.73	4.96	1.24	5.86			2.48	4.68	6.88	9.08	0.20	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	1.50	0.24	0.22	0.28	8.04	6.96	1.74	8.23			2.48	4.70	6.92	9.14	0.22	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	2.00	0.24	0.24	0.28	10.35	8.96	2.24	10.59			2.48	4.72	6.96	9.20	0.24	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	1.00	0.28	0.20	0.32	5.91	5.12	1.28	6.05			3.06	5.76	8.46	11.16	0.24	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	1.50	0.28	0.22	0.32	8.22	7.12	1.78	8.41			3.06	5.78	8.50	11.22	0.26	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.00	0.28	0.24	0.32	10.53	9.12	2.28	10.77			3.06	5.80	8.54	11.28	0.27	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.50	0.28	0.26	0.32	12.84	11.12	2.78	13.14			3.06	5.82	8.58	11.34	0.28	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	1.00	0.32	0.20	0.36	6.10	5.28	1.32	6.24			3.64	6.84	10.04	13.24	0.24	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	1.50	0.32	0.22	0.36	8.41	7.28	1.82	8.60			3.64	6.86	10.08	13.30	0.26	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.00	0.32	0.24	0.36	10.72	9.28	2.32	10.97			3.64	6.88	10.12	13.36	0.28	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.50	0.32	0.26	0.36	13.03	11.28	2.82	13.33			3.64	6.90	10.16	13.42	0.29	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	3.00	0.32	0.28	0.36	15.33	13.28	3.32	15.69			3.64	6.92	10.20	13.48	0.30	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	1.00	0.36	0.20	0.40	6.28	5.44	1.36	6.43			4.22	7.92	11.62	15.32	0.24	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	1.50	0.36	0.22	0.40	8.59	7.44	1.86	8.79			4.22	7.94	11.66	15.38	0.26	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.00	0.36	0.24	0.40	10.90	9.44	2.36	11.15			4.22	7.96	11.70	15.44	0.28	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.50	0.36	0.26	0.40	13.21	11.44	2.86	13.52			4.22	7.98	11.74	15.50	0.29	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	3.00	0.36	0.28	0.40	15.52	13.44	3.36	15.88			4.22	8.00	11.78	15.56	0.31	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

	OUTER WALL			INNER WALL	
	VERTICAL BARS		HORIZONTAL BARS	VERTICAL BARS	HORIZONTAL BARS
S	NEAR FACE (N.F.)	FAR FACE (F.F.)	NEAR F. AND FAR F.	BOTH SIDES	BOTH SIDES
1.00	14 B 101 THRU 14 B 137	12 C 101 THRU 12C 137	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 137	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 137	12 C 101 THRU 12C 138	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 138	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 153	12 C 101 THRU 12C 153	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 153	12 E 101 THRU 12 E 111
2.00	14 B 101 THRU 14 B 138	12 C 101 THRU 12C 138	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 138	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 153	12 C 101 THRU 12C 154	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 154	12 E 101 THRU 12 E 111
	14 B 101 THRU 14 B 169	12 C 101 THRU 12C 169	12 A 101 THRU 12A 114	14 D101 THRU 14 D162, 16 D101 THRU 16 D106	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 139	12 C 101 THRU 12C 139	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 139	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 155	12 C 101 THRU 12C 155	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 155	12 E 101 THRU 12 E 111
	14 B 101 THRU 14 B 170	12 C 101 THRU 12C 170	12 A 101 THRU 12A 115	14 D101 THRU 14 D162, 16 D101 THRU 16 D108	12 E 101 THRU 12 E 115
	14B101 THRU 14B177, 18B101 THRU 18 B108	12 C 101 THRU 12C 186	12 A 101 THRU 12A 118	14 D101 THRU 14 D162, 16 D101 THRU 16 D123	12 E 101 THRU 12 E 118
3.00	14 B 101 THRU 14 B 141	12 C 101 THRU 12C 141	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 141	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 156	12 C 101 THRU 12C 156	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 156	12 E 101 THRU 12 E 111
	14 B 101 THRU 14 B 171	12 C 101 THRU 12C 171	12 A 101 THRU 12A 115	14 D101 THRU 14 D162, 16 D101 THRU 16 D109	12 E 101 THRU 12 E 115
	14B101 THRU 14B177, 18B101 THRU 18 B109	12 C 101 THRU 12C 187	12 A 101 THRU 12A 118	14 D101 THRU 14 D162, 16 D101 THRU 16 D124	12 E 101 THRU 12 E 118
	14B101 THRU 14B177, 18B101 THRU 18 B114, 20B101 THRU 20 B111	12 C 101 THRU 12C 202	12 A 101 THRU 12A 121	14 D101 THRU 14 D162, 16 D101 THRU 16 D140	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 142	12 C 101 THRU 12C 142	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 142	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 157	12 C 101 THRU 12C 157	12 A 101 THRU 12A 112	14 D 101 THRU 14 D 157	12 E 101 THRU 12 E 112
	14 B 101 THRU 14 B 173	12 C 101 THRU 12C 173	12 A 101 THRU 12A 115	14 D101 THRU 14 D162, 16 D101 THRU 16 D111	12 E 101 THRU 12 E 115
	14B101 THRU 14B177, 18B101 THRU 18 B111	12 C 101 THRU 12C 188	12 A 101 THRU 12A 118	14 D101 THRU 14 D162, 16 D101 THRU 16 D126	12 E 101 THRU 12 E 118
	14B101 THRU 14B177, 18B101 THRU 18 B114, 20B101 THRU 20 B113	12 C 101 THRU 12C 203	12 A 101 THRU 12A 122	14 D101 THRU 14 D162, 16 D101 THRU 16 D142	12 E 101 THRU 12 E 122

STANDARD RCBC INLET & OUTLET

SLOPE = 4 : 1 SKEW = 90 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL		BOT. SLAB	COMMON TO CELL 1 , 2 , 3 & 4						X1				X2	ROW OF GRATE PIPES							
		EXT	INT								1	2	3	4		1-CELL		2-CELL		3-CELL		4-CELL	
S	H	W1	W2	T1	L1	L2	h1	C	-	-	CELL	CELL	CELL	CELL		NO.	SPACING	NO.	SPACING	NO.	SPACING	NO.	SPACING
1.00	1.00	0.20	0.20	0.24	4.80	4.80	1.20	4.95			1.40	2.60	3.80	5.00	0.20								
1.50	1.00	0.22	0.20	0.26	4.88	4.88	1.22	5.03			1.94	3.64	5.34	7.04	0.20	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
	1.50	0.22	0.22	0.26	6.88	6.88	1.72	7.09			1.94	3.66	5.38	7.10	0.22	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	1.00	0.24	0.20	0.28	4.96	4.96	1.24	5.11			2.48	4.68	6.88	9.08	0.20	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	1.50	0.24	0.22	0.28	6.96	6.96	1.74	7.17			2.48	4.70	6.92	9.14	0.22	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
	2.00	0.24	0.24	0.28	8.96	8.96	2.24	9.24			2.48	4.72	6.96	9.20	0.24	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	1.00	0.28	0.20	0.32	5.12	5.12	1.28	5.28			3.06	5.76	8.46	11.16	0.24	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	1.50	0.28	0.22	0.32	7.12	7.12	1.78	7.34			3.06	5.78	8.50	11.22	0.26	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.00	0.28	0.24	0.32	9.12	9.12	2.28	9.40			3.06	5.80	8.54	11.28	0.27	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
	2.50	0.28	0.26	0.32	11.12	11.12	2.78	11.46			3.06	5.82	8.58	11.34	0.28	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	1.00	0.32	0.20	0.36	5.28	5.28	1.32	5.44			3.64	6.84	10.04	13.24	0.24	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	1.50	0.32	0.22	0.36	7.28	7.28	1.82	7.50			3.64	6.86	10.08	13.30	0.26	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.00	0.32	0.24	0.36	9.28	9.28	2.32	9.57			3.64	6.88	10.12	13.36	0.28	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	2.50	0.32	0.26	0.36	11.28	11.28	2.82	11.63			3.64	6.90	10.16	13.42	0.29	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
	3.00	0.32	0.28	0.36	13.28	13.28	3.32	13.69			3.64	6.92	10.20	13.48	0.30	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	1.00	0.36	0.20	0.40	5.44	5.44	1.36	5.61			4.22	7.92	11.62	15.32	0.24	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	1.50	0.36	0.22	0.40	7.44	7.44	1.86	7.67			4.22	7.94	11.66	15.38	0.26	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.00	0.36	0.24	0.40	9.44	9.44	2.36	9.73			4.22	7.96	11.70	15.44	0.28	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	2.50	0.36	0.26	0.40	11.44	11.44	2.86	11.79			4.22	7.98	11.74	15.50	0.29	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875
	3.00	0.36	0.28	0.40	13.44	13.44	3.36	13.85			4.22	8.00	11.78	15.56	0.31	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

	OUTER WALL			INNER WALL	
	VERTICAL BARS		HORIZONTAL BARS	VERTICAL BARS	HORIZONTAL BARS
S	NEAR FACE (N.F.)	FAR FACE (F.F.)	NEAR F. AND FAR F.	BOTH SIDES	BOTH SIDES
1.00	14 B 101 THRU 14 B 132	12 C 101 THRU 12C 132	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 132	12 E 101 THRU 12 E 107
1.50	14 B 101 THRU 14 B 132	12 C 101 THRU 12C 133	12 A 101 THRU 12A 107	14 D 101 THRU 14 D 133	12 E 101 THRU 12 E 107
	14 B 101 THRU 14 B 146	12 C 101 THRU 12C 146	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 146	12 E 101 THRU 12 E 111
2.00	14 B 101 THRU 14 B 133	12 C 101 THRU 12C 133	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 133	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 146	12 C 101 THRU 12C 146	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 146	12 E 101 THRU 12 E 111
	14 B 101 THRU 14 B 160	12 C 101 THRU 12C 160	12 A 101 THRU 12A 114	14 D101 THRU 14 D154, 16 D101 THRU 16 D105	12 E 101 THRU 12 E 114
2.50	14 B 101 THRU 14 B 134	12 C 101 THRU 12C 134	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 134	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 147	12 C 101 THRU 12C 147	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 147	12 E 101 THRU 12 E 111
	14 B 101 THRU 14 B 161	12 C 101 THRU 12C 161	12 A 101 THRU 12A 115	14 D101 THRU 14 D154, 16 D101 THRU 16 D106	12 E 101 THRU 12 E 115
	14B101 THRU 14B168, 18B101 THRU 18 B106	12 C 101 THRU 12C 174	12 A 101 THRU 12A 118	14 D101 THRU 14 D154, 16 D101 THRU 16 D120	12 E 101 THRU 12 E 118
3.00	14 B 101 THRU 14 B 135	12 C 101 THRU 12C 135	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 135	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 148	12 C 101 THRU 12C 149	12 A 101 THRU 12A 111	14 D 101 THRU 14 D 149	12 E 101 THRU 12 E 111
	14 B 101 THRU 14 B 162	12 C 101 THRU 12C 162	12 A 101 THRU 12A 115	14 D101 THRU 14 D154, 16 D101 THRU 16 D107	12 E 101 THRU 12 E 115
	14B101 THRU 14B168, 18B101 THRU 18 B107	12 C 101 THRU 12C 175	12 A 101 THRU 12A 118	14 D101 THRU 14 D154, 16 D101 THRU 16 D121	12 E 101 THRU 12 E 118
	14B101 THRU 14B168, 18B101 THRU 18 B112, 20B101 THRU 20 B108	12 C 101 THRU 12C 189	12 A 101 THRU 12A 121	14 D101 THRU 14 D154, 16 D101 THRU 16 D134	12 E 101 THRU 12 E 121
3.50	14 B 101 THRU 14 B 136	12 C 101 THRU 12C 136	12 A 101 THRU 12A 108	14 D 101 THRU 14 D 136	12 E 101 THRU 12 E 108
	14 B 101 THRU 14 B 149	12 C 101 THRU 12C 150	12 A 101 THRU 12A 112	14 D 101 THRU 14 D 150	12 E 101 THRU 12 E 112
	14 B 101 THRU 14 B 163	12 C 101 THRU 12C 163	12 A 101 THRU 12A 115	14 D101 THRU 14 D154, 16 D101 THRU 16 D109	12 E 101 THRU 12 E 115
	14B101 THRU 14B168, 18B101 THRU 18 B108	12 C 101 THRU 12C 176	12 A 101 THRU 12A 118	14 D101 THRU 14 D154, 16 D101 THRU 16 D122	12 E 101 THRU 12 E 118
	14B101 THRU 14B168, 18B101 THRU 18 B112, 20B101 THRU 20 B110	12 C 101 THRU 12C 190	12 A 101 THRU 12A 122	14 D101 THRU 14 D154, 16 D101 THRU 16 D135	12 E 101 THRU 12 E 122

SLOPE = 4 : 1

SKEW = 45 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	1.40	5.39	12 F 101 THRU 12 F	104	12 G 101 THRU 12 G	104	2.60	4.19	12 F 101 THRU 12 F	110	12 G 101 THRU 12 G	110
1.50	1.00	0.22	0.20	1.94	4.96	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.64	3.26	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
	1.50	0.22	0.22	1.94	7.79	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.66	6.07	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
2.00	1.00	0.24	0.20	2.48	4.53	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.68	2.33	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
	1.50	0.24	0.22	2.48	7.36	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.70	5.14	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	2.00	0.24	0.24	2.48	10.19	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.72	7.95	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
2.50	1.00	0.28	0.20	3.06	4.18	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.76	1.48	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
	1.50	0.28	0.22	3.06	7.01	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.78	4.29	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
	2.00	0.28	0.24	3.06	9.84	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.80	7.10	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
	2.50	0.28	0.26	3.06	12.67	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.82	9.91	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
3.00	1.00	0.32	0.20	3.64	3.83	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.84	0.63	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	1.50	0.32	0.22	3.64	6.66	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.86	3.44	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	2.00	0.32	0.24	3.64	9.48	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.88	6.24	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	2.50	0.32	0.26	3.64	12.31	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.90	9.05	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132
	3.00	0.32	0.28	3.64	15.14	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.92	11.86	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132
3.50	1.00	0.36	0.20	4.22	3.47	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	7.69	0.23	12 F 101 THRU 12 F	135	12 G 101 THRU 12 G	135
	1.50	0.36	0.22	4.22	6.30	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	7.94	2.58	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	2.00	0.36	0.24	4.22	9.13	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	7.96	5.39	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	2.50	0.36	0.26	4.22	11.96	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	7.98	8.20	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	3.00	0.36	0.28	4.22	14.79	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	8.00	11.01	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	3.80	2.99	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116	5.00	1.79	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122
1.50	1.00	0.22	0.20	5.34	1.56	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124	6.90	0.14	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132
	1.50	0.22	0.22	5.38	4.35	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124	7.10	2.63	12 F 101 THRU 12 F	133	12 G 101 THRU 12 G	133
2.00	1.00	0.24	0.20	6.88	0.13	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131	7.01	2.07	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132
	1.50	0.24	0.22	6.92	2.92	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	9.14	0.70	12 F 101 THRU 12 F	143	12 G 101 THRU 12 G	143
	2.00	0.24	0.24	6.96	5.71	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	9.20	3.47	12 F 101 THRU 12 F	143	12 G 101 THRU 12 G	143
2.50	1.00	0.28	0.20	7.24	1.22	12 F 101 THRU 12 F	133	12 G 101 THRU 12 G	133	7.24	3.92	12 F 101 THRU 12 F	133	12 G 101 THRU 12 G	133
	1.50	0.28	0.22	8.50	1.57	12 F 101 THRU 12 F	140	12 G 101 THRU 12 G	140	10.07	1.15	12 F 101 THRU 12 F	147	12 G 101 THRU 12 G	147
	2.00	0.28	0.24	8.54	4.36	12 F 101 THRU 12 F	140	12 G 101 THRU 12 G	140	11.28	1.62	12 F 101 THRU 12 F	153	12 G 101 THRU 12 G	153
	2.50	0.28	0.26	8.58	7.15	12 F 101 THRU 12 F	140	12 G 101 THRU 12 G	140	11.34	4.39	12 F 101 THRU 12 F	154	12 G 101 THRU 12 G	154
3.00	1.00	0.32	0.20	7.47	2.57	12 F 101 THRU 12 F	134	12 G 101 THRU 12 G	134	7.47	5.77	12 F 101 THRU 12 F	134	12 G 101 THRU 12 G	134
	1.50	0.32	0.22	10.08	0.22	12 F 101 THRU 12 F	147	12 G 101 THRU 12 G	147	10.30	3.00	12 F 101 THRU 12 F	149	12 G 101 THRU 12 G	149
	2.00	0.32	0.24	10.12	3.00	12 F 101 THRU 12 F	148	12 G 101 THRU 12 G	148	13.12	0.24	12 F 101 THRU 12 F	163	12 G 101 THRU 12 G	163
	2.50	0.32	0.26	10.16	5.79	12 F 101 THRU 12 F	148	12 G 101 THRU 12 G	148	13.42	2.53	12 F 101 THRU 12 F	164	12 G 101 THRU 12 G	164
	3.00	0.32	0.28	10.20	8.58	12 F 101 THRU 12 F	148	12 G 101 THRU 12 G	148	13.48	5.30	12 F 101 THRU 12 F	164	12 G 101 THRU 12 G	164
3.50	1.00	0.36	0.20	7.69	3.93	12 F 101 THRU 12 F	135	12 G 101 THRU 12 G	135	7.69	7.63	12 F 101 THRU 12 F	135	12 G 101 THRU 12 G	135
	1.50	0.36	0.22	10.52	1.14	12 F 101 THRU 12 F	150	12 G 101 THRU 12 G	150	10.52	4.86	12 F 101 THRU 12 F	150	12 G 101 THRU 12 G	150
	2.00	0.36	0.24	11.70	1.65	12 F 101 THRU 12 F	156	12 G 101 THRU 12 G	156	13.35	2.09	12 F 101 THRU 12 F	164	12 G 101 THRU 12 G	164
	2.50	0.36	0.26	11.74	4.44	12 F 101 THRU 12 F	156	12 G 101 THRU 12 G	156	15.50	0.68	12 F 101 THRU 12 F	175	12 G 101 THRU 12 G	175
	3.00	0.36	0.28	11.78	7.23	12 F 101 THRU 12 F	156	12 G 101 THRU 12 G	156	15.56	3.45	12 F 101 THRU 12 F	175	12 G 101 THRU 12 G	175

SLOPE = 4 : 1

SKEW = 60 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	0.81	4.73	12 F 101 THRU 12 F	103	12 G 101 THRU 12 G	103	1.50	4.04	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106
1.50	1.00	0.22	0.20	1.12	4.51	12 F 101 THRU 12 F	104	12 G 101 THRU 12 G	104	2.10	3.53	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109
	1.50	0.22	0.22	1.12	6.82	12 F 101 THRU 12 F	104	12 G 101 THRU 12 G	104	2.11	5.83	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109
2.00	1.00	0.24	0.20	1.43	4.30	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106	2.70	3.03	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
	1.50	0.24	0.22	1.43	6.61	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106	2.71	5.33	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
	2.00	0.24	0.24	1.43	8.92	12 F 101 THRU 12 F	106	12 G 101 THRU 12 G	106	2.73	7.62	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112
2.50	1.00	0.28	0.20	1.77	4.14	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.33	2.58	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
	1.50	0.28	0.22	1.77	6.45	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.34	4.88	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
	2.00	0.28	0.24	1.77	8.76	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.35	7.18	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
	2.50	0.28	0.26	1.77	11.07	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.36	9.48	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
3.00	1.00	0.32	0.20	2.10	4.00	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.95	2.15	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	1.50	0.32	0.22	2.10	6.31	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.96	4.45	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	2.00	0.32	0.24	2.10	8.62	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.97	6.75	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	2.50	0.32	0.26	2.10	10.93	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	3.98	9.05	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118
	3.00	0.32	0.28	2.10	13.23	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.00	11.33	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
3.50	1.00	0.36	0.20	2.44	3.84	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.57	1.71	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	1.50	0.36	0.22	2.44	6.15	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.58	4.01	12 F 101 THRU 12 F	121	12 G 101 THRU 12 G	121
	2.00	0.36	0.24	2.44	8.46	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.60	6.30	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122
	2.50	0.36	0.26	2.44	10.77	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.61	8.60	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122
	3.00	0.36	0.28	2.44	13.08	12 F 101 THRU 12 F	111	12 G 101 THRU 12 G	111	4.62	10.90	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	1.00	0.20	0.20	2.19	3.35	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	2.89	2.65	12 F 101 THRU 12 F	113	12 G 101 THRU 12 G	113
1.50	1.00	0.22	0.20	3.08	2.55	12 F 101 THRU 12 F	114	12 G 101 THRU 12 G	114	4.06	1.57	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
	1.50	0.22	0.22	3.11	4.83	12 F 101 THRU 12 F	114	12 G 101 THRU 12 G	114	4.10	3.84	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119
2.00	1.00	0.24	0.20	3.97	1.76	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	5.24	0.49	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
	1.50	0.24	0.22	4.00	4.04	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119	5.28	2.76	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
	2.00	0.24	0.24	4.02	6.33	12 F 101 THRU 12 F	119	12 G 101 THRU 12 G	119	5.31	5.04	12 F 101 THRU 12 F	125	12 G 101 THRU 12 G	125
2.50	1.00	0.28	0.20	4.88	1.03	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	5.91	0.53	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128
	1.50	0.28	0.22	4.91	3.31	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	6.48	1.74	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	2.00	0.28	0.24	4.93	5.60	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	6.51	4.02	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
	2.50	0.28	0.26	4.95	7.89	12 F 101 THRU 12 F	123	12 G 101 THRU 12 G	123	6.55	6.29	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
3.00	1.00	0.32	0.20	5.80	0.30	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	6.10	1.54	12 F 101 THRU 12 F	129	12 G 101 THRU 12 G	129
	1.50	0.32	0.22	5.82	2.59	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	7.68	0.73	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	2.00	0.32	0.24	5.84	4.88	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	7.71	3.01	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	2.50	0.32	0.26	5.87	7.16	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	7.75	5.28	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
	3.00	0.32	0.28	5.89	9.44	12 F 101 THRU 12 F	128	12 G 101 THRU 12 G	128	7.78	7.55	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
3.50	1.00	0.36	0.20	6.28	0.43	12 F 101 THRU 12 F	130	12 G 101 THRU 12 G	130	6.28	2.56	12 F 101 THRU 12 F	130	12 G 101 THRU 12 G	130
	1.50	0.36	0.22	6.73	1.86	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	8.59	0.29	12 F 101 THRU 12 F	141	12 G 101 THRU 12 G	141
	2.00	0.36	0.24	6.75	4.15	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	8.91	1.99	12 F 101 THRU 12 F	143	12 G 101 THRU 12 G	143
	2.50	0.36	0.26	6.78	6.43	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132	8.95	4.26	12 F 101 THRU 12 F	143	12 G 101 THRU 12 G	143
	3.00	0.36	0.28	6.80	8.72	12 F 101 THRU 12 F	133	12 G 101 THRU 12 G	133	8.98	6.54	12 F 101 THRU 12 F	143	12 G 101 THRU 12 G	143

STANDARD RCBC INLET & OUTLET

SLOPE = 6 : 1 SKEW = 45 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL		BOT. SLAB	COMMON TO CELL 1 , 2 , 3 & 4						X1				X2
S	H	EXT W1	INT W2	T1	L1	L2	h1	C	-	-	1 CELL	2 CELL	3 CELL	4 CELL	
1.00	0.70	0.20	0.20	0.24	7.64	5.40	0.90	7.69			1.40	2.60	3.80	5.00	0.20
1.50	0.70	0.22	0.20	0.26	7.81	5.52	0.92	7.86			1.94	3.64	5.34	7.04	0.20
2.00	0.70	0.24	0.20	0.28	7.98	5.64	0.94	8.04			2.48	4.68	6.88	9.08	0.20
2.50	0.70	0.28	0.20	0.32	8.32	5.88	0.98	8.38			3.06	5.76	8.46	11.16	0.24
3.00	0.70	0.32	0.20	0.36	8.65	6.12	1.02	8.71			3.64	6.84	10.04	13.24	0.24
3.50	0.70	0.36	0.20	0.40	8.99	6.36	1.06	9.05			4.22	7.92	11.62	15.32	0.24

ROW OF GRATE PIPES

S	1-CELL NO.	1-CELL SPACING	2-CELL NO.	2-CELL SPACING	3-CELL NO.	3-CELL SPACING	4-CELL NO.	4-CELL SPACING
1.00								
1.50	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

S	OUTER WALL VERTICAL BARS NEAR FACE (N.F.)	OUTER WALL VERTICAL BARS FAR FACE (F.F.)	OUTER WALL HORIZONTAL BARS NEAR F. AND FAR F.	INNER WALL VERTICAL BARS BOTH SIDES	INNER WALL HORIZONTAL BARS BOTH SIDES
1.00	14 B 101 THRU 14 B 151	12 C 101 THRU 12C 151	12 A 101 THRU 12A 105	14 D 101 THRU 14 D 151	12 E 101 THRU 12 E 105
1.50	14 B 101 THRU 14 B 152	12 C 101 THRU 12C 152	12 A 101 THRU 12A 105	14 D 101 THRU 14 D 152	12 E 101 THRU 12 E 105
2.00	14 B 101 THRU 14 B 153	12 C 101 THRU 12C 153	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 153	12 E 101 THRU 12 E 106
2.50	14 B 101 THRU 14 B 155	12 C 101 THRU 12C 155	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 155	12 E 101 THRU 12 E 106
3.00	14 B 101 THRU 14 B 158	12 C 101 THRU 12C 158	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 158	12 E 101 THRU 12 E 106
3.50	14 B 101 THRU 14 B 160	12 C 101 THRU 12C 160	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 160	12 E 101 THRU 12 E 106

STANDARD RCBC INLET & OUTLET

SLOPE = 6 : 1 SKEW = 60 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET / ROW OF GRATE PIPES

R.C.B.C. CELL		WALL EXT	WALL INT	BOT. SLAB	COMMON TO CELL 1, 2, 3 & 4						X1 1 CELL	X1 2 CELL	X1 3 CELL	X1 4 CELL	X2	1-CELL NO.	1-CELL SPACING	2-CELL NO.	2-CELL SPACING	3-CELL NO.	3-CELL SPACING	4-CELL NO.	4-CELL SPACING
S	H	W1	W2	T1	L1	L2	h1	C	-	-													
1.00	0.70	0.20	0.20	0.24	6.24	5.40	0.90	6.30			1.40	2.60	3.80	5.00	0.20								
1.50	0.70	0.22	0.20	0.26	6.37	5.52	0.92	6.44			1.94	3.64	5.34	7.04	0.20	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	0.70	0.24	0.20	0.28	6.51	5.64	0.94	6.58			2.48	4.68	6.88	9.08	0.20	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	0.70	0.28	0.20	0.32	6.79	5.88	0.98	6.86			3.06	5.76	8.46	11.16	0.24	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	0.70	0.32	0.20	0.36	7.07	6.12	1.02	7.14			3.64	6.84	10.04	13.24	0.24	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	0.70	0.36	0.20	0.40	7.34	6.36	1.06	7.42			4.22	7.92	11.62	15.32	0.24	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

S	OUTER WALL VERTICAL BARS NEAR FACE (N.F.)	OUTER WALL VERTICAL BARS FAR FACE (F.F.)	OUTER WALL HORIZONTAL BARS NEAR F. AND FAR F.	INNER WALL VERTICAL BARS BOTH SIDES	INNER WALL HORIZONTAL BARS BOTH SIDES
1.00	14 B 101 THRU 14 B 141	12 C 101 THRU 12C 142	12 A 101 THRU 12A 105	14 D 101 THRU 14 D 142	12 E 101 THRU 12 E 105
1.50	14 B 101 THRU 14 B 142	12 C 101 THRU 12C 142	12 A 101 THRU 12A 105	14 D 101 THRU 14 D 142	12 E 101 THRU 12 E 105
2.00	14 B 101 THRU 14 B 143	12 C 101 THRU 12C 143	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 143	12 E 101 THRU 12 E 106
2.50	14 B 101 THRU 14 B 145	12 C 101 THRU 12C 145	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 145	12 E 101 THRU 12 E 106
3.00	14 B 101 THRU 14 B 147	12 C 101 THRU 12C 147	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 147	12 E 101 THRU 12 E 106
3.50	14 B 101 THRU 14 B 149	12 C 101 THRU 12C 149	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 149	12 E 101 THRU 12 E 106

STANDARD RCBC INLET & OUTLET

SLOPE = 6 : 1 SKEW = 90 Degrees

DIMENSIONAL SCHEDULE FOR INLET & OUTLET

R.C.B.C. CELL		WALL		BOT. SLAB	COMMON TO CELL 1 , 2 , 3 & 4						X1				X2	ROW OF GRATE PIPES							
		EXT	INT								1	2	3	4		1-CELL		2-CELL		3-CELL		4-CELL	
S	H	W1	W2	T1	L1	L2	h1	C	-	-	CELL	CELL	CELL	CELL		NO.	SPACING	NO.	SPACING	NO.	SPACING	NO.	SPACING
1.00	0.70	0.20	0.20	0.24	5.40	5.40	0.90	5.47			1.40	2.60	3.80	5.00	0.20								
1.50	0.70	0.22	0.20	0.26	5.52	5.52	0.92	5.60			1.94	3.64	5.34	7.04	0.20	1	2 @ 0.75	2	4 @ 0.75	3	6 @ 0.75	4	8 @ 0.75
2.00	0.70	0.24	0.20	0.28	5.64	5.64	0.94	5.72			2.48	4.68	6.88	9.08	0.20	1	2 @ 1.00	2	4 @ 1.00	3	6 @ 1.00	4	8 @ 1.00
2.50	0.70	0.28	0.20	0.32	5.88	5.88	0.98	5.96			3.06	5.76	8.46	11.16	0.24	2	3 @ 0.83	4	6 @ 0.83	6	9 @ 0.83	8	12 @ 0.83
3.00	0.70	0.32	0.20	0.36	6.12	6.12	1.02	6.20			3.64	6.84	10.04	13.24	0.24	2	3 @ 1.00	4	6 @ 1.00	6	9 @ 1.00	8	12 @ 1.00
3.50	0.70	0.36	0.20	0.40	6.36	6.36	1.06	6.45			4.22	7.92	11.62	15.32	0.24	3	4 @ 0.875	6	8 @ 0.875	9	12 @ 0.875	12	16 @ 0.875

NUMBER AND SPACING OF VARIABLE BARS

S	OUTER WALL VERTICAL BARS NEAR FACE (N.F.)	OUTER WALL VERTICAL BARS FAR FACE (F.F.)	OUTER WALL HORIZONTAL BARS NEAR F. AND FAR F.	INNER WALL VERTICAL BARS BOTH SIDES	INNER WALL HORIZONTAL BARS BOTH SIDES
1.00	14 B 101 THRU 14 B 136	12 C 101 THRU 12C 136	12 A 101 THRU 12A 105	14 D 101 THRU 14 D 136	12 E 101 THRU 12 E 105
1.50	14 B 101 THRU 14 B 137	12 C 101 THRU 12C 137	12 A 101 THRU 12A 105	14 D 101 THRU 14 D 137	12 E 101 THRU 12 E 105
2.00	14 B 101 THRU 14 B 137	12 C 101 THRU 12C 138	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 138	12 E 101 THRU 12 E 106
2.50	14 B 101 THRU 14 B 139	12 C 101 THRU 12C 139	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 139	12 E 101 THRU 12 E 106
3.00	14 B 101 THRU 14 B 141	12 C 101 THRU 12C 141	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 141	12 E 101 THRU 12 E 106
3.50	14 B 101 THRU 14 B 142	12 C 101 THRU 12C 142	12 A 101 THRU 12A 106	14 D 101 THRU 14 D 142	12 E 101 THRU 12 E 106

SLOPE = 6 : 1

SKEW = 45 Degrees

STANDARD RCBC INLET & OUTLET

APRON VARIABLE BARS

R.C.B.C. CELL		WALL & TOP SLAB		1 - CELL						2 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	0.70	0.20	0.20	1.40	6.24	12 F 101 THRU 12 F	104	12 G 101 THRU 12 G	104	2.60	5.04	12 F 101 THRU 12 F	110	12 G 101 THRU 12 G	110
1.50	0.70	0.22	0.20	1.94	5.87	12 F 101 THRU 12 F	107	12 G 101 THRU 12 G	107	3.64	4.17	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115
2.00	0.70	0.24	0.20	2.48	5.50	12 F 101 THRU 12 F	109	12 G 101 THRU 12 G	109	4.68	3.30	12 F 101 THRU 12 F	120	12 G 101 THRU 12 G	120
2.50	0.70	0.28	0.20	3.06	5.26	12 F 101 THRU 12 F	112	12 G 101 THRU 12 G	112	5.76	2.56	12 F 101 THRU 12 F	126	12 G 101 THRU 12 G	126
3.00	0.70	0.32	0.20	3.64	5.01	12 F 101 THRU 12 F	115	12 G 101 THRU 12 G	115	6.84	1.81	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131
3.50	0.70	0.36	0.20	4.22	4.77	12 F 101 THRU 12 F	118	12 G 101 THRU 12 G	118	7.92	1.07	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137

R.C.B.C. CELL		WALL & TOP SLAB		3 - CELL						4 - CELL					
				DIMENSION		REINFORCEMENT (12 @ 0.20)				DIMENSION		REINFORCEMENT (12 @ 0.20)			
S	H	W1/T2	W2	L3	L4	TOP BARS		BOTTOM BARS		L3	L4	TOP BARS		BOTTOM BARS	
1.00	0.70	0.20	0.20	3.80	3.84	12 F 101 THRU 12 F	116	12 G 101 THRU 12 G	116	5.00	2.64	12 F 101 THRU 12 F	122	12 G 101 THRU 12 G	122
1.50	0.70	0.22	0.20	5.34	2.47	12 F 101 THRU 12 F	124	12 G 101 THRU 12 G	124	7.04	0.77	12 F 101 THRU 12 F	132	12 G 101 THRU 12 G	132
2.00	0.70	0.24	0.20	6.88	1.10	12 F 101 THRU 12 F	131	12 G 101 THRU 12 G	131	7.98	1.10	12 F 101 THRU 12 F	137	12 G 101 THRU 12 G	137
2.50	0.70	0.28	0.20	8.32	0.14	12 F 101 THRU 12 F	139	12 G 101 THRU 12 G	139	8.32	2.84	12 F 101 THRU 12 F	139	12 G 101 THRU 12 G	139
3.00	0.70	0.32	0.20	8.65	1.39	12 F 101 THRU 12 F	140	12 G 101 THRU 12 G	140	8.65	4.59	12 F 101 THRU 12 F	140	12 G 101 THRU 12 G	140
3.50	0.70	0.36	0.20	8.99	2.63	12 F 101 THRU 12 F	142	12 G 101 THRU 12 G	142	8.99	6.33	12 F 101 THRU 12 F	142	12 G 101 THRU 12 G	142

R.C.B.C. INLET & OUTLET DETAILS

2 TO 1

KINGDOM OF SAUDI ARABIA
MINISTRY OF TRANSPORT
STUDY AND DESIGN DEPARTMENT
MOH. A. AL-SWAILEM CO.
WING WALL DETAILS
S = 2:1 & H = 2.00
WW/AP-2:1-1
Outer Wing Wall Elevation
S = 2:1 & H = 2.00m.
2 : 1
A101 Ø12mm@0.15 (Both Sides)
12 mm.Ø Horizontal Bars @ 0.15 m.(Both Face) (A 101)
S=2:1 & Angle=90° varies @ 0.15
S=2:1 & Angle=60° varies @ 0.15
S=2:1 & Angle=45° varies @ 0.15
Ø14mm B101(Near Face)
Ø18mm B101(N.F.)
4@0.15=0.60m.
7@0.15=1.05m.
6@0.15=0.90m.
Ø12mm@0.15 C101(Far Face)
2.00 - Downstream
1.00 - Upstream
2.000
0.100
0.080
0.170
0.250@90°
0.289@60°
0.354@45°
0.566@45°
0.466@60°
0.400@90°
(T1+0.05-0.25)@90°
(T1+0.05-0.25)/sin60@60°
(T1+0.05-0.25)/sin45@45°
0.090
0.104
0.127
0.080
0.092
0.113
0.050
0.100
0.170

المملكة العربية السعودية
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 2:1 & H = 2.50

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.: WW/AP-2:1-2
DRAWN
SCALE: As Shown
CHECKED BY: CIVIL ENG'R.
APPROVED BY: RESIDENT ENG'R.

Outer Wing Wall Elevation

S = 2:1 & H = 3.00m.

3

المملكة العربية السعودية
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ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 2:1 & H = 3.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-2:1-3		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 2:1 & H = 2.00m.

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المملكة العربية السعودية
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ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 2:1 & H = 2.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-2:1-4		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 2:1 & H = 2.50m.

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المملكة العربية السعودية
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 2:1 & H = 2.50

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-2:1-5		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 2:1 & H = 3.00m.

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ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 2:1 & H = 3.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-2:1-6		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " A - A "

S = 2:1

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المملكة العربية السعودية
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ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS
1 - Cell

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.	CHECKED BY:	APPROVED BY:
WW/AP-2:1-7		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " A - A "

S = 2:1

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ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS
1 to 4 - Cell

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-2:1-8		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

APRON @ Skew 45°

S = 2:1

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :

APRON DETAILS
1 to 4 - Cell

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:		CHECKED BY:	APPROVED BY:
WW/AP-2:1-9			
DRAWN	SCALE As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " C- C "

APRON @ Skew 60°

S = 2:1

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :	REVIEW STATUS/CODING
APRON DETAILS 1 to 4 - Cell	A : APPROVED B : APPROVED WITH CORRECTIONS C : REVISE & RESUBMIT D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-2:1-10		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Apron Plan

Normal Skew

Detail " A "

S = 2:1

Section " B- B "

Scale 1 : 40 Mtrs.

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DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 2 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	6	8	12	16	18	22

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS plus TABLES

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-2:1-11		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

NOTE:

FOR CULVERTS LESS THAN TWO(2) METERS HEIGHT, THE Ø OF BARS ARE UNIFORM (B101=D101=Ø14mm@0.15, C101=Ø12mm@0.15 & A101=Ø12mm@0.15)

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

Detail " A "
S = 2:1

Section " B- B "
Scale 1 : 40 Mtrs.

Section " C- C "

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 2 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	6	8	12	16	18	22

Apron Plan
Normal Skew

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP - 2:1		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

WING WALL VERTICAL BAR SCHEDULE

SLOPE = 2:1 & ANGLE = 45deg.

OUTER WING WALL (Far Face)				INNER WING WALL (Both Sides)			
Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)	Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)
3.00	B101	4 @ 0.15	20	3.00	D101	24 @ 0.15	16
		20 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.50	B101	16 @ 0.15	18	2.50	D101	16 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14
2.00	B101	6 @ 0.15	18	2.00	D101	6 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

SLOPE = 2:1 & ANGLE = 60deg.

3.00	B101	6 @ 0.15	20	3.00	D101	20 @ 0.15	16
		14 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.50	B101	12 @ 0.15	18	2.50	D101	12 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14
2.00	B101	7 @ 0.15	18	2.00	D101	7 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

SLOPE = 2:1 & ANGLE = 90deg.

3.00	B101	6 @ 0.15	20	3.00	D101	18 @ 0.15	16
		12 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.50	B101	12 @ 0.15	18	2.50	D101	12 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14
2.00	B101	4 @ 0.15	18	2.00	D101	4 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

SLOPE = 4:1 & ANGLE = 45deg.

OUTER WING WALL (Far Face)				INNER WING WALL (Both SIdes)			
Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)	Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)
3.00	B101	14 @ 0.15	20	3.00	D101	50 @ 0.15	16
		22 @ 0.15	18			varies @ 0.15	14
		15 @ 0.15	18				
		varies @ 0.15	14				
2.50	B101	17 @ 0.15	18	2.50	D101	31 @ 0.15	16
		15 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.00	B101	13 @ 0.15	18	2.00	D101	12 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

SLOPE = 4:1 & ANGLE = 60deg.

3.00	B101	11 @ 0.15	20	3.00	D101	40 @ 0.15	16
		14 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.50	B101	10 @ 0.15	18	2.50	D101	25 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14
2.00	B101			2.00	D101	10 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

SLOPE = 4:1 & ANGLE = 90deg.

3.00	B101	8 @ 0.15	20	3.00	D101	34 @ 0.15	16
		12 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.50	B101	8 @ 0.15	18	2.50	D101	22 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14
2.00	B101			2.00	D101	8 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

SLOPE = 3:1 & ANGLE = 45deg.

OUTER WING WALL (Far Face)				INNER WING WALL (Both Sides)			
Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)	Height H (m)	B-Mark	No. of Spaces	Bar Size (Ø mm)
3.00	B101	6 @ 0.15	20	3.00	D101	27 @ 0.15	16
		21 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.50	B101	17 @ 0.15	18	2.50	D101	17 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14
2.00	B101	7 @ 0.15	18	2.00	D101	7 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

SLOPE = 3:1 & ANGLE = 60deg.

3.00	B101	3 @ 0.12		3.00	D101	3 @ 0.12	
		17 @ 0.15	20			29 @ 0.15	16
		12 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.50	B101	7 @ 0.15	20	2.50	D101	19 @ 0.15	16
		12 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.00	B101	7 @ 0.15	18	2.00	D101	7 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

SLOPE = 3:1 & ANGLE = 90deg.

3.00	B101	23 @ 0.15	20	3.00	D101	37 @ 0.15	16
		20 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.50	B101	9 @ 0.15	20	2.50	D101	23 @ 0.15	16
		20 @ 0.15	18			varies @ 0.15	14
		varies @ 0.15	14				
2.00	B101	14 @ 0.15	18	2.00	D101	8 @ 0.15	16
		varies @ 0.15	14			varies @ 0.15	14

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL VERTICAL BAR SCHEDULE

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.: WW/AP-01
CHECKED BY:
APPROVED BY:
DRAWN
SCALE: As Shown
CIVIL ENG'R.
RESIDENT ENG'R.

Wing Wall Elevation

Scale 1 : 40 Mtrs.

Detail " A "

Scale 1 : 40 Mtrs.

SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 2 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	6	8	12	16	18	22

Slope = 3 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Slope = 4 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

Note:

n1 = Outer Wing Wall Key in Slope 2 : 1 = W1 + 0.10
But for 3 : 1 & 4 : 1 = W1 + 0.20

n2 = Outer & Inner Wing Wall Key in Slope 2 : 1 = T1 + 0.05
But for 3 : 1 & 4 : 1 = T1 + 0.10

n3 = If the Slope is 2 : 1 = 0.26
But for 3 : 1 & 4 : 1 = 0.11

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلي السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAIL & TABLES

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-02		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " A - A "

Scale 1 : 40 Mtrs.

Apron Plan

Normal Skew

Section " B- B "

Scale 1 : 40 Mtrs.

Section " A - A "

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
APRON & WING WALL DETAILS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-03		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

X1=16.36 (4 Cell Max.)
X1=12.50 (3 Cell Max.)
X1=8.64 (2 Cell Max.)
X1=4.78 (1 Cell Max.)
N=Spaces
W/2
W/3
W/4
W/6
X1
0.689
shortest bar
F301 & G301
0.050
0.689
0.800
L3
0.040
L4
45°
APRON @ Skew 45°
0.726
shortest bar
0.200
0.500
60°
APRON @ Skew 60°
L3=4.78(1 CELL MAX.)
L3=8.64(2 Cell Max.)
L3=10.295 (3 Cell Max.)
L3=10.295 (4 Cell Max.)
L4=5.515 (1 Cell Max.)
L4=16.55 (2 Cell Max.)
L4=2.905 (3 Cell Max.)
L4=6.065 (4 Cell Max.)
(Minimum)
APRON @ Skew 45°
S = 2:1
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT
شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.
TITLE:
عنوان المخطط :
APRON DETAILS
REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED
DRWG. NO.:
WW/AP-04
DRAWN
SCALE
As Shown
CHECKED BY:
CIVIL ENG'R.
APPROVED BY:
RESIDENT ENG'R.

S=3:1 & Angle=90°
varies @ 0.15
Ø14mm B101(Near Face)
7@0.15=1.05m.
Ø18mm B101(N.F.)
0.080
S=3:1 & Angle=60°
varies @ 0.15
Ø14mm B101(Near Face)
7@0.15=1.05m.
Ø18mm B101(N.F.)
0.092
S=3:1 & Angle=45°
varies @ 0.15
Ø14mm B101(Near Face)
14@0.15=2.10m.
Ø18mm B101(N.F.)
0.113
0.080
A101 Ø12mm@0.15 (Both Sides)
0.050
3 : 1
12 mm Ø Horizontal Bars @ 0.15 m.(Both Face) (A 101)
2.000
0.100
T1+0.10
T2
0.170
0.080
1.00 - Upstream
2.00 - Downstream
(T1+0.10-0.25)@90°
(T1+0.10-0.25)/sin60@60°
(T1+0.10-0.25)/sin45@45°
0.400@90°
0.462@60°
0.566@45°
0.250@90°
0.289@60°
0.354@45°
Outer Wing Wall Elevation
S = 3:1 & H = 2.00m.
1
3 TO 1
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT
شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.
TITLE: عنوان المخطط :
WING WALL DETAILS
S = 3:1 & H = 2.00
REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED
DRWG. NO.:
WW/AP-3:1-1
CHECKED BY:
APPROVED BY:
DRAWN
SCALE
As Shown
CIVIL ENG'R.
RESIDENT ENG'R.

0.090
S=3:1 & Angle=90°
varies @ 0.15
Ø14mm B101(Near Face)
17@0.15=2.55m.
Ø18mm B101(N.F.)
0.080
0.104
S=3:1 & Angle=60°
varies @ 0.15
Ø14mm B101(Near Face)
12@0.15=1.80m.
Ø18mm B101(N.F.)
7@0.15=1.05m.
Ø20mm B101(N.F.)
0.092
0.127
S=3:1 & Angle=45°
varies @ 0.15
Ø14mm B101(Near Face)
20@0.15=3.00m.
Ø18mm B101(N.F.)
9@0.15=1.35m.
Ø20mm B101N.F.)
0.113
A101 Ø12mm@0.15 (Both Sides)
0.050
B
0.14
T2
3 : 1
12 mm Ø Horizontal Bars @ 0.15 m.(Both Face) (A 101)
2.500
0.100
T1+0.10
1.00 - Upstream
2.00 - Downstream
0.170
0.080
(T1+0.10-0.25)@90°
(T1+0.10-0.25)/sin60@60°
(T1+0.10-0.25)/sin45@45°
0.400@90°
0.462@60°
0.566@45°
0.250@90°
0.289@60°
0.354@45°
Outer Wing Wall Elevation
S = 3:1 & H = 2.50m.
2
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT
شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.
TITLE: عنوان المخطط :
WING WALL DETAILS
S = 3:1 & H = 2.50
REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED
DRWG. NO.:
WW/AP-3:1-2
CHECKED BY:
APPROVED BY:
DRAWN
SCALE
As Shown
CIVIL ENG'R.
RESIDENT ENG'R.

Outer Wing Wall Elevation

S = 3:1 & H = 3.00m.

3

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلي السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 3:1 & H = 3.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1-3		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 3:1 & H = 2.00m.

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المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 3:1 & H = 2.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1-4		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 3:1 & H = 2.50m.

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المملكة العربية السعودية
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 3:1 & H = 2.50

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1-5		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 3:1 & H = 3.00m.

6

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 3:1 & H = 3.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1-6		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " A - A "

S = 3:1 & 4:1

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المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :	REVIEW STATUS/CODING
WING WALL & APRON DETAILS 1 - Cell	A : APPROVED B : APPROVED WITH CORRECTIONS C : REVISE & RESUBMIT D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1-7		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " A - A "

S = 3:1 & 4:1

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شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS
1 to 4 - Cell

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1-8		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
APRON DETAILS
1 to 4 - Cell

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1-9		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

APRON @ Skew 60°

S = 3:1

Section " C- C "

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المملكة العربية السعودية
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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :

APRON DETAILS
1 to 4 - Cell

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1-10		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Apron Plan

Normal Skew

Detail " A "

S = 3:1 & 4:1

Section " B- B "

Scale 1 : 40 Mtrs.

11

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 3 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

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ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS plus TABLES

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.: WW/AP-3:1-11
CHECKED BY:
APPROVED BY:
DRAWN
SCALE As Shown
CIVIL ENG'R.
RESIDENT ENG'R.

NOTE:

FOR CULVERTS LESS THAN TWO(2) METERS HEIGHT, THE Ø OF BARS ARE UNIFORM (B101=D101=Ø14mm@0.15, C101=Ø12mm@0.15 & A101=Ø12mm@0.15)

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 : 3 : 1 : 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

11

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 3 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-3:1		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Outer Wing Wall Elevation

S = 4:1 & H = 2.00m.

1

4 TO 1

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 4:1 & H = 2.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-1		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Outer Wing Wall Elevation

S = 4:1 & H = 2.50m.

2

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 4:1 & H = 2.50

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-2		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Outer Wing Wall Elevation

S = 4:1 & H = 3.00m.

3

المملكة العربية السعودية
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ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 4:1 & H = 3.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-3		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 4:1 & H = 2.00m.

4

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 4:1 & H = 2.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-4		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 4:1 & H = 2.50m.

5

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 4:1 & H = 2.50

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-5		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Inner Wing Wall Elevation

S = 4:1 & H = 3.00m.

6

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL DETAILS
S = 4:1 & H = 3.00

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-6		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " A - A "

S = 3:1 & 4:1

7

المملكة العربية السعودية
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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :	REVIEW STATUS/CODING
WING WALL & APRON DETAILS 1 - Cell	A : APPROVED B : APPROVED WITH CORRECTIONS C : REVISE & RESUBMIT D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-7		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " A - A "

S = 3:1 & 4:1

8

المملكة العربية السعودية
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شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS
2 to 4 - Cell

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-8		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

APRON @ Skew 45°

S = 4:1

9

المملكة العربية السعودية
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شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :

APRON DETAILS
1 to 4 - Cell

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1-9		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Section " C- C "

APRON @ Skew 60°

S = 4:1

10

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :	REVIEW STATUS/CODING
APRON DETAILS 1 to 4 - Cell	A : APPROVED B : APPROVED WITH CORRECTIONS C : REVISE & RESUBMIT D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:		CHECKED BY:	APPROVED BY:
WW/AP-4:1-10			
DRAWN	SCALE		
	As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

Apron Plan

Normal Skew

Detail " A "

S = 3:1 & 4:1

Section " B- B "

Scale 1 : 40 Mtrs.

11

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 4 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS plus TABLES

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.: WW/AP-4:1-11
DRAWN
SCALE: As Shown
CHECKED BY: CIVIL ENG'R.
APPROVED BY: RESIDENT ENG'R.

Outer Wing Wall Elevation
S = 4:1 & H = 2.00m.

Outer Wing Wall Elevation
S = 4:1 & H = 2.50m.

Outer Wing Wall Elevation
S = 4:1 & H = 3.00m.

Inner Wing Wall Elevation
S = 4:1 & H = 2.00m.

Inner Wing Wall Elevation
S = 4:1 & H = 2.50m.

Inner Wing Wall Elevation
S = 4:1 & H = 3.00m.

NOTE:

FOR CULVERTS LESS THAN TWO(2) METERS HEIGHT, THE Ø OF BARS ARE UNIFORM (B101=D101=Ø14mm@0.15, C101=Ø12mm@0.15 & A101=Ø12mm@0.15)

Section " A - A "
S = 3:1 & 4:1

Section " A - A "
S = 3:1 & 4:1

DIMENSIONAL SCHEDULE for INLET and OUTLET

SLOPE = 2 : 1 ; 3 : 1 ; 4 : 1

S	H	W1	W2	X2
1.00	1.00	0.20	0.20	0.20
1.50	1.00	0.22	0.20	0.20
	1.50	0.22	0.22	0.22
2.00	1.00	0.24	0.20	0.20
	1.50	0.24	0.22	0.22
	2.00	0.24	0.24	0.24
2.50	1.00	0.28	0.20	0.24
	1.50	0.28	0.22	0.26
	2.00	0.28	0.24	0.27
	2.50	0.28	0.26	0.28
3.00	1.00	0.32	0.20	0.24
	1.50	0.32	0.22	0.26
	2.00	0.32	0.24	0.28
	2.50	0.32	0.26	0.29
	3.00	0.32	0.28	0.30
3.50	1.00	0.36	0.20	0.24
	1.50	0.36	0.22	0.28
	2.00	0.36	0.24	0.28
	2.50	0.36	0.26	0.29
	3.00	0.36	0.28	0.31

Detail " A "
S = 3:1 & 4:1

Section " B- B "
Scale 1 : 40 Mtrs.

Section " C- C "

SPACING FOR LONGITUDINAL BARS IN APRON (F300 & G300)

Slope = 4 : 1

SPAN	1.00	1.50	2.00	2.50	3.00	3.50
a	0.05	0.15	0.10	0.05	0.15	0.10
N	3	4	6	8	9	11

APRON @ Skew 45°
S = 4:1

APRON @ Skew 60°
S = 4:1

Apron Plan
Normal Skew

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STUDY AND DESIGN DEPARTMENT

شركة محمد العلي السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
WING WALL & APRON DETAILS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT – NOT REVIEWED

DRWG. NO.:	CHECKED BY:	APPROVED BY:
WW/AP-4:1		
DRAWN / SCALE: As Shown	CIVIL ENG'R.	RESIDENT ENG'R.

DETAILS

Outer Wing Wall Elevation

Inner Wing Wall Elevation

max D101

0.15 a b

a=(H+T2+0.17)/cos(culv. slope)−0.05/cos(side slope)−0.08*tan(side slope)

b =W2+0.10

min D101

0.15 a b

a =0.17+0.09*tan(side slope)−0.05/cos(side slope) −0.09*tan(culv. slope)

b =W2+0.10

A200=sqrt((L−0.17)² +(H+T2−0.05)²)

A200=sqrt((L−0.17)² +(H+T2−0.05)²)

min A101=0.11or0.26/tan(side slope) −0.08−0.05/sin(side slope)

max A101=(L−0.08)/cos(culv. slope)−0.10/(tan(side slope)−tan(culv. slope))−0.05/sin(side slope−culv. slope)

Section " A - A "

With Overlap

F301=G301

L3 0.15 L4

L3min=(0.50or0.80)*tan(skew) −0.05/cos(skew)−0.04

L3max=X1−0.04−spacing*tan(skew) −0.05/cos(skew)

L4 =X1−0.08

No Overlap

F301=G301

L3 0.15 L4

L3min=L3max−((no. of bars−1)* spacing*tan(skew))

L3max=(L*tan(skew))−0.10/cos(skew)

L4 =L−0.10/sin(skew)

A100=L−0.10/sin(skew)

0.25 d a b c

F201

a=sqrt((T1+(0.05or0.10)−0.05 −0.035−0.08)²*2)

b=W1+(0.10or0.20)−0.04−0.033

c=T1+(0.05or0.10)−0.08−0.20

d=sqrt((W1−0.08)²+(0.50+0.20)²)

F300=G300=L−0.10/sin(skew)

0.25 0.25 a b

F202

a=sqrt((T1+(0.05or0.10)−0.05 −0.035−0.08)²*2)

b=W2+0.10*2−0.033*2

Toe Wall @ Down Stream (2.0m.)
@ UpStream (1.0m.)

Section " B- B "

Section " C- C "

With Overlap
L3
0.15
L4
F301=G301
L3min=(0.50or0.80)*tan(skew)
−0.05/cos(skew)−0.04
L3max=X1−0.04−spacing*tan(skew
−0.05/cos(skew)
L4 =X1−0.08
F300=G300=L−0.10/sin(skew)
F301 & G301
L4
F301 & G301
L3
0.050
X1
L4
L3
0.040
0.500
0.800
0.500
0.800
L3
0.040
L4
0.050
ø
APRON (with overlap)

No Overlap
L3
0.15
L4
F301=G301
L3min=L3max−((no. of bars−1)*
spacing*tan(skew))
L3max=(L*tan(skew))−0.10/cos(skew)
L4 =L−0.10/sin(skew)
F300=G300=L−0.10/sin(skew)
F301 & G301
L4
F301 & G301
L3
0.050
L4
L3
0.040
0.500
0.800
0.500
0.800
L3
0.040
L4
0.050
X1
APRON (no overlap)

Outer Wing Wall Elevation

Inner Wing Wall Elevation

Section " A - A

Section " B- B "

Section " C- C "

APRON (with overlap)

Toe Wall @ Down Stream (2.0m.)
@ UpStream (1.0m.)

APRON (no overlap)

Station **52+242.000**

RCBC **1 - 1.50 x 1.00**

R. C. B. C.

T1 = 0.26 W1 = 0.22
T2 = 0.22 W2 = 0.00
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 1566.905
B.C. slope = 0.00754

Skew = 90 ° Normal
P.G.L. = 1569.243
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station **52+242.000** **skew** **90°** **Normal**

	S	H	T1	T2	W1	W2	TABLE 1		BARREL LENGTH (L)		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1		TOTAL
1	1.50	1.00	0.26	0.22	0.22	0.00	0.50	1.94	20.000		20.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1 20.000 m.	A	0.48 0.705	0.40	14	1.185	0.00	1.19	51 x 4 = 204	241.740	1.21	292.505
	B	1.86 x=0.25	0.40	14	2.36	0	2.36	51 x 2 = 102	240.720	1.21	291.271
	D	1.86	0.14	16	1.86	0	1.86	143 x 2 = 286	531.960	1.58	840.497
	F	x=0.25 1.36	0.40	14	1.86	0	1.86	51 x 2 = 102	189.720	1.21	229.561
	G	x=0.25 1.36	0.44	14	1.61	0	1.61	46 x 2 = 92	148.120	1.21	179.225
	LONG'NAL 20.000	12 8.740 I.L.=60xØ	VAR.	14	20.740	0	20.740	11+14+7*2 39	808.860	1.21	978.721
										SUB-TOTAL =	**2811.780**

Station 52+242.000 skew 90 ∘ Normal

TABLE 1

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL			X	BARREL LENGTH P2		TOTAL
1	1.50	1.00	0.26	0.22	0.22			1.94	15.026		15.026

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 15.026 m.	A	0.48 / 0.71	0.40	14	1.185	0.00	1.19	38 x 4 = 152	180.120	1.21	217.945
	B	1.86 / x=0.25	0.40	14	2.36	0	2.36	38 x 2 = 76	179.360	1.21	217.026
	D	1.86	0.14	16	1.86	0	1.86	108 x 2 = 216	401.760	1.58	634.781
	F	x=0.25 / 1.36	0.40	14	1.86	0	1.86	38 x 2 = 76	141.360	1.21	171.046
	G	x=0.25 / 1.36	0.44	14	1.61	0	1.61	35 x 2 = 70	112.700	1.21	136.367
	LONG'NAL 15.026	12 / 3.766 / D.I.= 60 x Ø	VAR.	14	15.766	0	15.766	11+14+7*2 39	614.874	1.21	743.998
										SUB TOTAL =	**2121.162**

Station 52+242.000 skew 90 Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB		X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.20	0.55		1.940	1.940

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.313 0.14	0.3	12	1.107	0	1.107	7 x 4 = 28	30.987	0.888	27.516
	E101	1.860	-	18	1.860	0	1.860	10 x 2 = 20	37.20	2.00	74.400
	E102	1.860	-	14	1.860	0	1.860	2 x 2 = 4	7.44	1.21	9.002
	E103	0.120 0.24 0.14 0.15	0.2	12	0.800	0	0.800	10 x 2 = 20	16.00	0.89	14.208
END BARREL KEY	H301	1.860	-	24	1.860	0	1.860	4 x 2 = 8	14.880	3.55	52.824
	H302	0.320 0.396 0.28 0.320	0.15	14	1.316	0	1.316	13 x 2 = 26	34.215	1.21	41.401
	H300 *WALL*	0.800	0.3	16	0.800	0	0.800	4 x 4 = 16	12.80	1.58	20.224
	H300 *BOT.SLAB*	0.800	0.15	16	0.800	0	0.800	13 x 2 = 26	20.80	1.58	32.864
	WALL *EXP. JT.*	0.800	0.3	16	0.800	0	0.800	4 x 2 = 8	6.40	1.58	10.112
	Top & Bot. *EXP. JT.*	0.800	0.15	16	0.800	0	0.800	26 x 1 = 26	20.80	1.58	32.864
										SUB TOTAL =	**315.415**

Station 52+242.000 skew 90 INLET

	S	H	T1	T2	W1	TABLE 1				BARREL WIDTH	APRON LENGTH
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		X1	L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.5650°	0.43206°		1.940	2.404

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	1.860	as	14	1.860	0.00	1.860	2 x 1 = 2	3.720	1.21	4.501
	H202	0.25 0.24 0.339 0.327	0.15	14	1.156	0	1.156	13 x 1 = 13	15.033	1.21	18.190
	A100	2.304	as	12	2.304	0	2.304	6 x 2 = 12	27.648	0.89	24.551
	F201	0.25 0.552 0.262 0.247	0.23 0.2	14	1.540	0	1.540	13 x 2 = 26	40.044	1.21	48.454
	F300 G300	2.304	0.15	12	2.304	0	2.304	13 x 2 = 26	59.904	0.89	53.195
	L4 F301	1.860 x=0.15	0.2	12	2.160	0	2.160	13 x 1 = 13	28.080	0.89	24.935
	L4 G301	1.860 x=0.15	0.2	12	2.160	0	2.160	13 x 1 = 13	28.080	0.89	24.935
									TOTAL FOR INLET APRON		**198.762**

Station 52+242.000 skew 90 °

TABLE 1

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.56499°	-0.43206°		1.940	2.404

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	2.522	as	12	2.522	0	2.522	2 x 2 = 4	10.087	0.89	8.958
	B101	0.15 ave =0.727 0.28 max =1.294 min =0.160	0.15	14	1.157	0	1.157	16 x 2 = 32	37.02	1.21	44.797
	C101	0.15 ave =0.727 0.14 max =1.294 min =0.160	0.15	12	1.017	0	1.017	16 x 2 = 32	32.54	0.89	28.898
	A101	0.26 ave =1.173 max =2.017 min =0.328	0.15	12	1.173	0	1.173	7 x 4 = 28	32.831	0.89	29.154
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.89	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.89	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.89	3.055
									TOTAL FOR INLET WING WALL		**164.662**

Station 52+242.000 skew 90 °

TABLE 1

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.565 °			1.940	2.404

TOE WALL (INLET)	A205	1.860	as	14	1.860	0	1.860	10 x 1 = 10	18.600	1.21	22.506
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	13 x 1 = 13	33.670	1.21	40.741
									TOTAL FOR INLET TOE WALL		**63.247**

Station 52+242.000 skew 90 OUTLET→

TABLE 1

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.5650°	0.43206°		1.940	2.477
	0.15						0.10	1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	1.860	as	14	1.860	0.00	1.860	2 x 1 = 2	3.720	1.21	4.501
	H202	0.25 0.24 0.339 0.327	0.15	14	1.156	0	1.156	13 x 1 = 13	15.033	1.21	18.190
	A100	2.377	as	12	2.377	0	2.377	6 x 2 = 12	28.524	0.89	25.329
	F201	0.25 0.552 0.262 0.247	0.22 0.2	14	1.530	0	1.530	13 x 2 = 26	39.784	1.21	48.139
	F300 G300	2.377	0.15	12	2.377	0	2.377	13 x 2 = 26	61.802	0.89	54.880
	L4 F301	1.860 x=0.15	0.2	12	2.160	0	2.160	13 x 1 = 13	28.080	0.89	24.935
	L4 G301	1.860 x=0.15	0.2	12	2.160	0	2.160	13 x 1 = 13	28.080	0.89	24.935
									TOTAL FOR OUTLET APRON		**200.910**

Station 52+242.000 skew 90 °

TABLE 1

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.56499°	0.43206°		1.940	2.477
							0.5000	0.008			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	2.587	as	12	2.587	0	2.587	2 x 2 = 4	10.347	0.89	9.188
	B101	0.15 ave =0.726 0.28 max =1.294 min =0.158	0.15	14	1.156	0	1.156	16 x 2 = 32	37.00	1.21	44.771
	C101	0.15 ave =0.726 0.14 max =1.294 min =0.158	0.15	12	1.016	0	1.016	16 x 2 = 32	32.52	0.89	28.879
	A101	ave =1.204 max =2.080 0.26 min =0.328	0.15	12	1.204	0	1.204	7 x 4 = 28	33.722	0.89	29.945
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.89	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.89	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.89	3.055
									TOTAL FOR OUTLET WING WALL		**165.638**

Station 52+242.000 skew 90 °

TABLE 1

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
1	1.50	1.00	0.26	0.22	0.22	0.00	26.565 °			1.940	2.477

TOE WALL (OUTLET)	A205	1.860	as	14	1.860	0	1.860	20 x 1 = 20	37.200	1.21	45.012
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	13 x 1 = 13	59.670	1.21	72.201
									TOTAL FOR OUTLET TOE WALL		**117.213**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50201 REINFORCING STEEL (Grade 60) Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 52+242.000 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.20	0.55	35.026	1.940	1.940

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	27.516	472.177
E103		14.208	
W.W.		430.453	
A	14	510.451	3,920.072
B		508.297	
F		400.607	
G		315.592	
LONG'L		1,722.718	
E102		9.002	
H302		41.401	
W.W.		412.004	
D	16	1,475.278	1,571.342
H300		53.088	
E.J		42.976	
E101	18	74.400	74.400
W.W.	20	67.974	67.974
	22	0.000	0.000
H301	24	52.824	52.824
	25	0.000	0.000
		TOTAL WEIGHT =	**6,158.789**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 52+242.000 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	0.200	0.55	35.026	1.940	1.940

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	14.949
BOTTOM SLAB	Vol. = Length * X * T1	17.667
OUTER WALLS	Vol. = Length * H * 2W1	15.411
INNER WALLS	Vol. = Length * H * W2	0.000
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.039
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.175
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2	0.088
	TOTAL VOLUME =	**48.329**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 52+242.000 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
1	1.50	1.00	0.26	0.22	0.22	0.00	2.404	2.477	0.250	1.940	1.940

X2	SLOPE
0.2	2.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	1.166
APRON OUTLET	Vol. = Lo * X * T	1.201
TOE WALL INLET	Vol. = XS * T * (1-T)	0.364
TOE WALL OUTLET	Vol. = XS * T * (2-T)	0.849
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.585
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.602
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.000
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.000
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.164
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.171
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.000
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.000
END KEY BLOCKS OUTER (INLET & OUTLET)	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)*2	0.194
	TOTAL VOLUME =	**5.296**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station **33+550.793**

RCBC **2 - 1.50 x 1.00**

R. C. B. C.

T1 = 0.26 W1 = 0.22
T2 = 0.22 W2 = 0.20
SSL = 3.0000 SSR = 3.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2093.500
B.C. slope = 0.00400

Skew = 90 ° Normal
P.G.L. = 2096.176
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station **33+550.793** **skew** **90°** **Normal**

	S	H	T1	T2	W1	W2	TABLE 1		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WAL	SLOPE	X	P1		TOTAL
2	1.50	1.00	0.26	0.22	0.22	0.20	0.3333	3.64	20.000		20.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1, P1 20.000 m.	A	0.48 / 0.705	0.40	14	1.185	0.00	1.185	51 x 4 = 204	241.740	1.21	292.505
	B	2.405 / x=0.25	0.40	14	2.655	0	2.655	51 x 4 = 204	541.620	1.21	655.360
	D	3.560	0.22	20	3.56	0	3.56	92 x 2 = 184	655.040	2.47	1617.949
	F	x=0.25 / 1.36	0.40	14	1.86	0	1.86	51 x 2 = 102	189.720	1.21	229.561
	G	x=0.25 / 1.36	0.44	14	1.61	0	1.61	46 x 3 = 138	222.180	1.21	268.838
	LONG'NAL 20.000	12 / 8.740 / .l. = 60*dia.	VAR.	14	20.740	0	20.740	19+25+7*2+3 61	1265.139	1.21	1530.818
										SUB TOTAL =	**4595.032**

Station 33+550.793 skew 90 Normal

							TABLE 1		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P2		TOTAL
2	1.50	1.00	0.26	0.22	0.22	0.20	0.33333	3.64	17.579		17.579

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P2 17.579 m.	A	0.48 0.705	0.40	14	1.185	0.00	1.185	45 x 4 = 180	213.300	1.21	258.093
	B	2.405 x=0.25	0.40	14	2.655	0	2.655	45 x 4 = 180	477.900	1.21	578.259
	D	3.56	0.22	20	3.56	0	3.56	81 x 2 = 162	576.720	2.47	1424.498
	F	x=0.25 1.36	0.40	14	1.86	0	1.86	45 x 2 = 90	167.400	1.21	202.554
	G	x=0.25 1.36	0.44	14	1.61	0	1.61	41 x 3 = 123	198.030	1.21	239.616
	LONG'NAL 17.579	12 6.319	VAR.	14	18.319	0	18.319	19+25+7*2+3 61	1117.458	1.21	1352.124
										SUB TOTAL =	**4055.145**

Station 33+550.793 skew 90 Normal

TABLE 1

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS		X	xs
2	1.50	1.00	0.22	0.20	0.26	0.300	0.55	0.22		3.640	3.640

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.313 0.14	0.3	12	1.107	0	1.107	13 x 4 = 52	57.547	0.888	51.101
	E101	3.560	-	18	3.560	0	3.560	10 x 2 = 20	71.20	2.00	142.400
	E102	3.560	-	14	3.560	0	3.560	2 x 2 = 4	14.24	1.21	17.230
	E103	0.220 0.24 0.14 0.15	0.2	12	0.900	0	0.900	19 x 2 = 38	34.20	0.888	30.370
	H301	3.560	-	24	3.560	0	3.560	4 x 2 = 8	28.480	3.550	101.104
	H302	0.320 0.325 0.23 0.320	0.15	14	1.195	0	1.195	25 x 2 = 50	59.763	1.210	72.314
	H300 *WALL*	0.800 dowel	0.3	16	0.800	0	0.800	4 x 6 = 24	19.20	1.580	30.336
	H300 *BOT.SLAB*	0.800 dowel	0.15	16	0.800	0	0.800	25 x 2 = 50	40.00	1.580	63.200
	WALL *EXP. JT.*	0.800 dowel	0.3	16	0.800	0	0.800	4 x 6 = 24	19.20	1.580	30.336
	Top & Bot. *EXP. JT.*	0.800 dowel	0.15	16	0.800	0	0.800	50 x 2 = 100	80.00	1.580	126.400
										SUB TOTAL =	**664.791**

Station 33+550.793 skew 90 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.4349°	0.22918°		3.640	3.617
	0.15						0.20	-1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	3.560	as	14	3.560	0.00	3.560	2 x 1 = 2	7.120	1.21	8.615
	H202	0.25 0.24 0.339 0.327	0.15	14	1.156	0	1.156	25 x 1 = 25	28.910	1.21	34.981
	A100	3.517	as	12	3.517	0	3.517	6 x 3 = 18	63.306	0.888	56.216
	F201	0.25 0.552 0.262 0.347	0.22 0.2	14	1.630	0	1.630	19 x 2 = 38	61.947	1.21	74.955
	F202	0.25 0.25 0.262 0.334 0.262	0.2	14	1.357	0	1.357	19 x 1 = 19	25.788	1.21	31.203
	F300 G300	3.517	0.30	12	3.517	0	3.517	14 x 2 = 28	98.476	0.888	87.447
	L4 F301	3.560 x=0.15	0.2	12	3.860	0	3.860	20 x 1 = 20	77.200	0.888	68.554
	L4 G301	3.560 x=0.15	0.2	12	3.860	0	3.860	20 x 1 = 20	77.200	0.888	68.554
									TOTAL FOR INLET APRON		**430.525**

Station 33+550.793 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.4349°	-0.22918°		3.640	3.617
							0.3333	-0.004			

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	3.640	as	12	3.640	0	3.640	2 x 3 = 6	21.841	0.888	19.395
	B101	0.15 ave =0.729 0.38 max =1.311 min =0.148	0.15	14	1.259	0	1.259	24 x 2 = 48	60.44	1.210	73.131
	C101	0.15 ave =0.729 0.14 max =1.311 min =0.148	0.15	12	1.019	0	1.019	24 x 2 = 48	48.92	0.888	43.440
	D101	0.15 ave =0.729 0.26 max =1.311 min =0.148	0.15	14	1.139	0	1.139	24 x 1 = 24	27.34	1.210	33.081
	A101	ave =1.588 max =3.084 0.11 min =0.092	0.15	12	1.588	0	1.588	8 x 6 = 48	76.230	0.888	67.692
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	D135	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	D136	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	7 x 1 = 7	5.040	0.888	4.476
									TOTAL FOR INLET WING WALL		**304.940**

Station 33+550.793 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.435°			3.640	3.617
TOE WALL (INLET)	A205	3.560	as	14	3.560	0	3.560	10 x 1 = 10	35.600	1.21	43.076
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	25 x 1 = 25	64.750	1.21	78.348
									TOTAL FOR INLET TOE WALL		**121.424**

Station 33+550.793 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.43491°	0.22918°		3.640	3.704
	0.15						0.20	1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	3.560	as	14	3.560	0.00	3.560	2 x 1 = 2	7.120	1.21	8.615
	H202	0.25 0.24 0.339 0.327	0.15	14	1.156	0	1.156	25 x 1 = 25	28.910	1.21	34.981
	A100	3.604	as	12	3.604	0	3.604	6 x 3 = 18	64.872	0.888	57.606
	F201	0.25 0.552 0.262 0.347	0.22 0.2	14	1.630	0	1.630	19 x 2 = 38	61.947	1.21	74.955
	F202	0.25 0.25 0.262 0.334 0.262	0.2	14	1.357	0	1.357	19 x 1 = 19	25.788	1.21	31.203
	F300 G300	3.604	0.30	12	3.604	0	3.604	14 x 2 = 28	100.912	0.888	89.610
	L4 F301	3.560 x=0.15	0.2	12	3.860	0	3.860	20 x 1 = 20	77.200	0.888	68.554
	L4 G301	3.560 x=0.15	0.2	12	3.860	0	3.860	20 x 1 = 20	77.200	0.888	68.554
									TOTAL FOR OUTLET APRON		**434.079**

Station 33+550.793 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.43491°	0.22918°		3.640	3.704
							0.3333	0.004			

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	3.723	as	12	3.723	0	3.723	2 x 3 = 6	22.336	0.888	19.834
	B101	0.15 ave =0.729 0.38 max =1.311 min =0.147	0.15	14	1.259	0	1.259	25 x 2 = 50	62.94	1.210	76.157
	C101	0.15 ave =0.729 0.14 max =1.311 min =0.147	0.15	12	1.019	0	1.019	25 x 2 = 50	50.94	0.888	45.234
	D101	0.15 ave =0.729 0.26 max =1.311 min =0.147	0.15	14	1.139	0	1.139	25 x 1 = 25	28.47	1.210	34.448
	A101	ave =1.626 max =3.160 0.11 min =0.092	0.15	12	1.626	0	1.626	8 x 6 = 48	78.054	0.888	69.312
	A300	0.198 0.06 0.140 0.5	0.15	12	0.898	0	0.898	8 x 2 = 16	14.368	0.888	12.759
	B109	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B110	0.300 1.42	as	20	1.720	0	1.720	1 x 2 = 2	3.440	2.47	8.497
	B116	0.300 1.42	as	20	1.720	0	1.720	2 x 2 = 4	6.880	2.47	16.994
	C189	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	C190	0.300 1.42	as	12	1.720	0	1.720	1 x 2 = 2	3.440	0.888	3.055
	D135	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	D136	0.300 1.42	as	16	1.720	0	1.720	2 x 1 = 2	3.440	1.58	5.435
	E300	0.300 0.120 0.300	0.15	12	0.720	0	0.720	7 x 1 = 7	5.040	0.888	4.476
									TOTAL FOR OUTLET WING WALL		**313.186**

Station 33+550.793 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
2	1.50	1.00	0.26	0.22	0.22	0.20	18.435°			3.640	3.704
TOE WALL (OUTLET)	A205	3.560	as	14	3.560	0	3.560	20 x 1 = 20	71.200	1.21	86.152
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	25 x 1 = 25	114.750	1.21	138.848
									TOTAL FOR OUTLET TOE WALL		**225.000**

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF STEEL

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **50201 REINFORCING STEEL (Grade 60)** Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 33+550.793 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	0.30	0.55	37.579	3.640	3.640

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	51.101	958.158
E103		30.370	
W.W		876.687	
A	14	550.598	6,560.025
B		1,233.619	
F		432.115	
G		508.454	
LONG'L		2,882.943	
E102		17.230	
H302		72.314	
W.W		862.751	
H300	16	93.536	250.272
E.J		156.736	
W.W		21.741	
E101	18	142.400	142.400
D	20	3,042.447	3,110.422
W.W		67.974	
	22	0.000	0.000
H301	24	101.104	101.104
	25	0.000	0.000
		TOTAL WEIGHT =	**11,122.380**

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 33+550.793 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	0.300	0.55	37.579	3.640	3.640

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	30.093
BOTTOM SLAB	Vol. = Length * X * T1	35.565
OUTER WALLS	Vol. = Length * H * 2W1	16.535
INNER WALLS	Vol. = Length * H * W2	7.516
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.109
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.328
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.188
	TOTAL VOLUME =	**90.334**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : *ITAL CONSULT*	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 33+550.793 skew 90° Normal

TABLE 1

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNES S (T)	X	xs
2	1.50	1.00	0.26	0.22	0.22	0.20	3.617	3.704	0.250	3.640	3.640

X2	SLOPE
0.2	3.000: 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	3.291
APRON OUTLET	Vol. = Lo * X * T	3.371
TOE WALL INLET	Vol. = XS * T * (1-T)	0.683
TOE WALL OUTLET	Vol. = XS * T * (2-T)	1.593
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	0.881
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	0.902
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	0.441
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	0.452
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.278
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.286
KEY BLOCKS INNER W.W. INLET	ol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.148
KEY BLOCKS INNER W.W. OUTLET	ol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.152
END KEY BLOCKS OUTER (INLET &	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)*2	0.364
	TOTAL VOLUME =	**12.842**

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Staion **37+836.740**

RCBC **3 - 3.00 x 2.50**

R. C. B. C.

T1 = 0.36 W1 = 0.32
T2 = 0.32 W2 = 0.26
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2018.990
B.C. slope = -0.00856

Skew = 90 ° Normal
P.G.L. = 2026.677
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Staion **37+836.740** **skew** **90°** **Normal**

	S	H	T1	T2	W1	W2	TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1=P2		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.50	10.16	20.000		20.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1 P1=P2 20.000 m.	A	1.03 / 1.33	0.24	14	2.360	0.00	2.36	84 x 8 = 672	1585.920	1.21	1918.963
	B	4.59 / x=0.30	0.36	16	4.890	0	4.89	56 x 8 = 448	2190.720	1.58	3461.338
	C	5.62	0.18	14	5.62	0	5.62	112 x 4 = 448	2517.760	1.21	3046.490
	D	3.54	0.16	14	3.54	0	3.54	126 x 8 = 1008	3568.320	1.21	4317.667
	E	3.52	0.24	14	3.52	0	3.52	84 x 4 = 336	1182.720	1.21	1431.091
	F	x=0.25 / 3.06	0.36	14	3.56	0	3.56	56 x 4 = 224	797.440	1.21	964.902
	G	x=0.25 / 3.06	0.44	14	3.31	0	3.31	46 x 8 = 368	1218.080	1.21	1473.877
	LONG'NAL 20.000	12 / 8.740 / L.L. = 60*dia.	VAR.	14	20.740	0	20.740	45+45+13*2+6*2 256	5309.440	1.21	6424.422

											SUB TOTAL =	23038.750

Staion 37+836.740 skew 90 Normal

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P3		TOTAL
3	3.00	2.50	0.36	0.32	0.32	0.26	0.50000	10.16	10.029		10.029

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P3 10.029 m.	A	1.03 1.33	0.24	14	2.360	0.00	2.36	42 x 4 = 168	396.480	1.21	479.741
	B	4.59 x=0.30	0.36	16	4.890	0	4.89	29 x 4 = 116	567.240	1.58	896.239
	C	5.62	0.18	14	5.62	0	5.62	56 x 2 = 112	629.440	1.21	761.622
	D	3.54	14	14	3.54	0	3.54	2 x 4 = 8	28.320	1.21	34.267
	E	3.52	0.24	14	3.52	0	3.52	42 x 2 = 84	295.680	1.21	357.773
	F	x=0.25 3.06	0.36	14	3.56	0	3.56	29 x 2 = 58	206.480	1.21	249.841
	G	x=0.25 3.06	0.44	14	3.31	0	3.31	24 x 4 = 96	317.760	1.21	384.490
	LONG'NAL 10.029	9.929	VAR.	14	9.929	0	9.929	45+45+13*2+6*2 128	1270.912	1.21	1537.804
										SUB TOTAL =	4701.776

Staion 37+836.740 skew 90 Normal TABLE 2

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIW	TBS	WC	TL	TTS		X	xs
3	3.00	2.50	0.32	0.26	0.36	0.200	0.60	0.32		10.16	10.160

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM & END BARREL KEY	S100	0.347 0.24	0.3	12	1.373	0	1.373	35 x 4 = 140	192.267	0.888	170.733
	E101	10.080	-	22	10.080	0	10.080	10 x 2 = 20	201.60	2.98	600.768
	E102	10.080	-	14	10.080	0	10.080	2 x 2 = 4	40.32	1.21	48.787
	E103	0.120 0.34 0.24 0.15	0.2	12	1.000	0	1.000	51 x 2 = 102	102.00	0.888	90.576
	H301	10.080	-	24	10.080	0	10.080	4 x 2 = 8	80.640	3.550	286.272
	H302	0.320 0.467 0.33 0.320	0.15	14	1.437	0	1.437	68 x 2 = 136	195.390	1.210	236.422
	H300 *WALL*	0.800 dowel	0.3	16	0.800	0	0.800	9 x 8 = 72	57.60	1.580	91.008
	H300 *BOT.SLAB*	0.800 dowel	0.15	16	0.800	0	0.800	68 x 2 = 136	108.80	1.580	171.904
	WALL *EXP. JT.*	0.924 dowel	0.3	16	0.924	0	0.924	9 x 8 = 72	66.53	1.580	105.114
	Top & Bot. *EXP. JT.*	0.924 dowel	0.15	16	0.924	0	0.924	136 x 2 = 272	251.33	1.580	397.098
										SUB TOTAL =	**2198.682**

Staion 37+836.740 skew 90 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56499°	-0.49027°		10.160	5.545
	0.15						0.10	-1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	10.080	as	14	10.080	0.00	10.080	2 x 1 = 2	20.160	1.21	24.394
	H202	0.25 0.34 0.481 0.327	0.15	14	1.398	0	1.398	68 x 1 = 68	95.053	1.21	115.014
	A100	5.445	as	12	5.445	0	5.445	6 x 4 = 24	130.680	0.888	116.044
	F201	0.25 0.693 0.262 0.347	0.22 0.2	14	1.772	0	1.772	28 x 2 = 56	99.209	1.21	120.043
	F202	0.25 0.25 0.262 0.394 0.262	0.2	14	1.417	0	1.417	28 x 2 = 56	79.367	1.21	96.033
	F300 G300	5.445	0.15	12	5.445	0	5.445	61 x 2 = 122	664.290	0.888	589.890
	L4 F301	10.080 x=0.15	0.2	12	10.380	0	10.380	29 x 1 = 29	301.020	0.888	267.306
	L4 G301	10.080 x=0.15	0.2	12	10.380	0	10.380	29 x 1 = 29	301.020	0.888	267.306
									TOTAL FOR INLET APRON		**1596.029**

Staion 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56499°	0.49027°		10.160	5.545
							0.5000	0.009			

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.047	as	12	6.047	0	6.047	2 x 4 = 8	48.374	0.888	42.956
	B101-18Ø	0.15 ave =2.452 0.38 max =2.894 min =2.010	0.15	18	2.982	0	2.982	13 x 2 = 26	77.53	2.000	155.059
	B101-14Ø	0.15 ave =1.046 0.38 max =1.935 min 0.158	0.15	14	1.576	0	1.576	24 x 2 = 48	75.67	1.210	91.561
	C101	0.15 ave =1.526 0.24 max =2.894 min =0.158	0.15	12	1.916	0	1.916	37 x 2 = 74	141.80	0.888	125.922
	D101-16Ø	0.15 ave =2.452 0.32 max =2.894 min =2.010	0.15	16	2.922	0	2.922	13 x 4 = 52	151.94	1.580	240.064
	D101-14Ø	0.15 ave =1.046 0.32 max =1.935 min =0.158	0.15	14	1.516	0	1.516	24 x 4 = 96	145.58	1.210	176.153
	A101	ave =2.738 max =5.148 0.26 min =0.328	0.15	12	2.738	0	2.738	17 x 8 = 136	372.379	0.888	330.672
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR INLET WING WALL		**1348.727**

Staion 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			10.160	5.545
TOE WALL (INLET)	A205	10.080	as	14	10.080	0	10.080	10 x 1 = 10	100.800	1.21	121.968
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	68 x 1 = 68	176.120	1.21	213.105
									TOTAL FOR INLET TOE WALL		**335.073**

Staion 37+836.740 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56499°	0.49027°		10.160	5.738
	0.15						0.10	1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	10.080	as	14	10.080	0.00	10.080	2 x 1 = 2	20.160	1.21	24.394
	H202	0.25 0.34 0.481 0.327	0.15	14	1.398	0	1.398	68 x 1 = 68	95.053	1.21	115.014
	A100	5.638	as	12	5.638	0	5.638	6 x 4 = 24	135.312	0.888	120.157
	F201	0.25 0.693 0.262 0.347	0.22 0.2	14	1.772	0	1.772	29 x 2 = 58	102.752	1.21	124.330
	F202	0.25 0.25 0.262 0.394 0.262	0.2	14	1.417	0	1.417	29 x 2 = 58	82.201	1.21	99.463
	F300 G300	5.638	0.15	12	5.638	0	5.638	61 x 2 = 122	687.836	0.888	610.798
	L4 F301	10.080 x=0.15	0.2	12	10.380	0	10.380	30 x 1 = 30	311.400	0.888	276.523
	L4 G301	10.080 x=0.15	0.2	12	10.380	0	10.380	30 x 1 = 30	311.400	0.888	276.523
									TOTAL FOR OUTLET APRON		**1647.203**

Staion 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.56499°	0.49027°		10.160	5.738
							0.5000	0.009			

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.219	as	12	6.219	0	6.219	2 x 4 = 8	49.752	0.888	44.180
	B101-18Ø	0.15 ave =2.452 0.38 max =2.894 min =2.010	0.15	18	2.982	0	2.982	13 x 2 = 26	77.53	2.000	155.059
	B101-14Ø	0.15 ave =1.046 0.38 max =1.935 min =0.158	0.15	14	1.576	0	1.576	25 x 2 = 50	78.82	1.210	95.376
	C101	0.15 ave =1.526 0.24 max =2.894 min =0.158	0.15	12	1.916	0	1.916	38 x 2 = 76	145.64	0.888	129.325
	D101-16Ø	0.15 ave =2.452 0.32 max =2.894 min =2.010	0.15	16	2.922	0	2.922	13 x 4 = 52	151.94	1.580	240.064
	D101-14Ø	0.15 ave =1.046 0.32 max =1.935 min =0.158	0.15	14	1.516	0	1.516	25 x 4 = 100	151.65	1.210	183.493
	A101	ave =2.835 max =5.341 0.26 min =0.328	0.15	12	2.835	0	2.835	17 x 8 = 136	385.503	0.888	342.327
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 2 = 4	13.680	1.58	21.614
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 2 = 36	28.080	0.888	24.935
									TOTAL FOR OUTLET WING WALL		**1376.163**

Staion 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
3	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			10.160	5.738

TOE WALL (OUTLET)	A205	10.080	as	14	10.080	0	10.080	20 x 1 = 20	201.600	1.21	243.936
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	68 x 1 = 68	312.120	1.21	377.665
									TOTAL FOR OUTLET TOE WALL		**621.601**

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **50201 REINFORCING STEEL (Grade 60)** Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Staion 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60	50.029	10.160	10.160

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	170.733	3,952.300
E103		90.576	
W.W.		3,690.991	
A	14	2,398.704	26,069.854
C		3,808.112	
D		4,351.934	
E		1,788.864	
F		1,214.743	
G		1,858.366	
LONG'L		7,962.226	
E102		48.787	
H302		236.422	
W.W.		2,401.695	
B	16	4,357.577	5,449.223
H300		262.912	
E.J.		502.212	
W.W.		326.522	
W.W.	18	310.119	310.119
W.W.	20	135.158	135.158
E101	22	600.768	600.768
H301	24	286.272	286.272
	25	0.000	0.000
		TOTAL WEIGHT =	**36,803.694**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Staion 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60	50.029	10.160	10.160

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	162.654
BOTTOM SLAB	Vol. = Length * X * T1	182.986
OUTER WALLS	Vol. = Length * H * 2W1	80.046
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	65.038
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.203
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	0.914
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.375
	TOTAL VOLUME =	**492.216**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Staion 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNES S (T)	X	xs
3	3.00	2.50	0.36	0.32	0.32	0.26	5.545	5.738	0.250	10.160	10.160

X2	SLOPE
0.29	2.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	14.084
APRON OUTLET	Vol. = Lo * X * T	14.575
TOE WALL INLET	Vol. = XS * T * (1-T)	1.905
TOE WALL OUTLET	Vol. = XS * T * (2-T)	4.445
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	3.915
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	4.047
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	4.066
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	4.207
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.545
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.567
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.536
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.558
END KEY BLOCKS OUTER (INLET &	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)*2	2.155
	TOTAL VOLUME =	**55.605**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Station **37+836.740**

RCBC **4 ####### 2.50**

R. C. B. C.

T1 = 0.36 W1 = 0.32
T2 = 0.32 W2 = 0.26
SSL = 2.0000 SSR = 2.0000
Inner Shoulder = 2.000
Outer Shoulder = 3.000
Shoulder Slope = 4.000
C.L.elev.= 2019.534
B.C. slope = -0.00888

Skew = 90 ° Normal
P.G.L. = 2026.677
SL = 0.015000 SR = -0.015000
C.W. = 7.300
H/MED. = 2.000
Layer = 0.630

Station **37+836.740** **skew** **90°** **Normal**

	S	H	T1	T2	W1	W2	TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P1=P2		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.50	13.42	20.000		20.000

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 1 - 1, P1=P2 20.000 m.	A	1.03 / 1.33	0.24	14	2.360	0.00	2.36	84 x 8 = 672	1585.920	1.21	1918.963
	B	4.59 / x=0.30	0.36	16	4.890	0	4.89	56 x 8 = 448	2190.720	1.58	3461.338
	C	5.62	0.18	14	5.62	0	5.62	112 x 8 = 896	5035.520	1.21	6092.979
	D	3.54	0.16	14	3.54	0	3.54	126 x 8 = 1008	3568.320	1.21	4317.667
	E	6.78	0.24	14	6.78	0	6.78	84 x 4 = 336	2278.080	1.21	2756.477
	F	x=0.25 / 3.06	0.36	14	3.56	0	3.56	56 x 4 = 224	797.440	1.21	964.902
	G	x=0.25 / 3.06	0.44	14	3.31	0	3.31	46 x 10 = 460	1522.600	1.21	1842.346
	LONG'NAL 20.000	12 / 8.740 / O.L.=60*Ø	VAR.	14	20.740	0	20.740	59+59+13*2+6*3 324	6719.760	1.21	8130.910
										SUB TOTAL =	**29485.582**

Station 37+836.740 **skew 90° Normal**

							TABLE 2		BARREL LENGTH		
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT. WALL	SLOPE	X	P3		TOTAL
4	3.00	2.50	0.36	0.32	0.32	0.26	0.50	13.42	7.852		7.852

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
SECTION 2 - 2 P3 7.852 m.	A	1.03 / 1.33	0.24	14	2.360	0.00	2.36	33 x 4 = 132	311.520	1.21	376.939
	B	4.59 / x=0.30	0.36	16	4.890	0	4.89	23 x 4 = 92	449.880	1.58	710.810
	C	5.62	0.18	14	5.62	0	5.62	44 x 4 = 176	989.120	1.21	1196.835
	D	3.54	0.16	14	3.54	0	3.54	50 x 4 = 200	708.000	1.21	856.680
	E	6.78	0.24	14	6.78	0	6.78	33 x 2 = 66	447.480	1.21	541.451
	F	x=0.25 / 3.06	0.36	14	3.56	0	3.56	23 x 2 = 46	163.760	1.21	198.150
	G	x=0.25 / 3.06	0.44	14	3.31	0	3.31	19 x 5 = 95	314.450	1.21	380.485
	LONG'NAL 7.852	7.752	VAR.	14	7.752	0	7.752	59+59+13*2+6*3 162	1255.824	1.21	1519.547
										SUB TOTAL =	**5780.897**

Station 37+836.740 skew 90

CELL	SPAN	HEIGHT	EXT.WALL	INT.WALL	BOT.SLAB	EDGE BEAM		TOP SLAB	BARREL DIMENSION		
NO.	B	D	TOW	TIN	TBS	WC	TL	TTS	L	X	xs
4	3.00	2.50	0.32	0.26	0.36	0.20	0.60	0.32	55.852	13.420	13.420

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
EDGE BEAM	S100	0.347 0.24	0.3	12	1.373	0	1.373	45 x 4 = 180	247.200	0.888	219.514
	E101	14.660 O.L=60*Ø	-	22	14.660	0	14.660	10 x 2 = 20	293.20	2.98	873.736
	E102	14.180 O.L=60*Ø	-	14	14.180	0	14.180	2 x 2 = 4	56.72	1.21	68.631
	E103	0.124 0.34 0.24 0.15	0.2	12	1.004	0	1.004	68 x 2 = 136	136.49	0.888	121.203
END BARREL KEY	H301	14.780 O.L=60*Ø	-	24	14.780	0	14.780	4 x 2 = 8	118.240	3.550	419.752
	H302	0.32 0.34 0.481 0.32	0.15	14	1.461	0	1.461	90 x 2 = 180	262.950	1.210	318.169
	H300 *WALL*	0.800	0.3	16	0.800	0	0.800	9 x 10 = 90	72.00	1.580	113.760
	H300 *BOT.SLAB*	0.800	0.15	16	0.800	0	0.800	90 x 2 = 180	144.00	1.580	227.520
	WALL *EXP. JT.*	0.800	0.3	16	0.800	0	0.800	9 x 10 = 90	72.00	1.580	113.760
	Top & Bot. *EXP. JT.*	0.800	0.15	16	0.800	0	0.800	180 x 2 = 360	288.00	1.580	455.040
										SUB TOTAL =	**2931.085**

Station 37+836.740 skew 90 ° INLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56499°	0.50877°		13.420	5.542
	0.15						0.10	-1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (INLET)	H201	13.340	as	14	13.340	0.00	13.340	2 x 1 = 2	26.680	1.21	32.283
	H202	0.25 0.34 0.481 0.327	0.15	14	1.398	0	1.398	90 x 1 = 90	125.805	1.21	152.224
	A100	5.442	as	12	5.442	0	5.442	6 x 5 = 30	163.260	0.888	144.975
	F201	0.25 0.693 0.262 0.347	0.22 0.2	14	1.772	0	1.772	28 x 2 = 56	99.209	1.21	120.043
	F202	0.25 0.25 0.262 0.394 0.262	0.2	14	1.417	0	1.417	28 x 3 = 84	119.050	1.21	144.050
	F300 G300	5.442	0.15	12	5.442	0	5.442	80 x 2 = 160	870.720	0.888	773.199
	L4 F301	13.340 x=0.15	0.2	12	13.640	0	13.640	29 x 1 = 29	395.560	0.888	351.257
	L4 G301	13.340 x=0.15	0.2	12	13.640	0	13.640	29 x 1 = 29	395.560	0.888	351.257
									TOTAL FOR INLET APRON		**2069.289**

Station 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56499°	-0.50877°		13.420	5.542
							0.5000	-0.009			

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (INLET)	A200	6.044	as	12	6.044	0	6.044	2 x 5 = 10	60.441	0.888	53.672
	B101-18Ø	0.15 ave = 2.436 0.38 max = 2.894 min = 1.978	0.15	18	2.966	0	2.966	13 x 2 = 26	77.12	2.000	154.244
	B101-14Ø	0.15 ave = 1.032 0.38 max = 1.903 min = 0.160	0.15	14	1.562	0	1.562	24 x 2 = 48	74.96	1.210	90.696
	C101	0.15 ave = 1.527 0.24 max = 2.894 min = 0.160	0.15	12	1.917	0	1.917	37 x 2 = 74	141.86	0.888	125.974
	D101-16Ø	0.15 ave = 2.436 0.32 max = 2.894 min = 1.978	0.15	16	2.906	0	2.906	13 x 6 = 78	226.69	1.580	358.163
	D101-14Ø	0.15 ave = 1.032 0.32 max = 1.903 min = 0.160	0.15	14	1.502	0	1.502	24 x 6 = 144	216.23	1.210	261.633
	A101	ave = 2.742 max = 5.156 0.26 min = 0.328	0.15	12	2.742	0	2.742	17 x 10 = 170	466.144	0.888	413.936
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR INLET WING WALL		**1678.737**

Station 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			13.420	5.542
TOE WALL (INLET)	A205	13.340	as	14	13.340	0	13.340	10 x 1 = 10	133.400	1.21	161.414
	A203	0.150 0.670 0.800 0.170	0.15	14	2.590	0	2.590	90 x 1 = 90	233.100	1.21	282.051
									TOTAL FOR INLET TOE WALL		**443.465**

Station 37+836.740 skew 90 ° OUTLET

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	IN. WALL	SIDE.-SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56499°	0.50877°		13.420	5.742
	0.15						0.10	1.0			

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
APRON (OUTLET)	H201	13.340	as	14	13.340	0.00	13.340	2 x 1 = 2	26.680	1.21	32.283
	H202	0.25 0.34 0.481 0.327	0.15	14	1.398	0	1.398	90 x 1 = 90	125.805	1.21	152.224
	A100	5.642	as	12	5.642	0	5.642	6 x 5 = 30	169.260	0.888	150.303
	F201	0.25 0.693 0.417 0.347	0.22 0.2	14	1.927	0	1.927	29 x 2 = 58	111.775	1.21	135.248
	F202	0.25 0.25 0.262 0.394 0.262	0.2	14	1.417	0	1.417	29 x 3 = 87	123.302	1.21	149.195
	F300 G300	5.642	0.15	12	5.642	0	5.642	80 x 2 = 160	902.720	0.888	801.615
	L4 F301	13.340 x=0.15	0.2	12	13.640	0	13.640	30 x 1 = 30	409.200	0.888	363.370
	L4 G301	13.340 x=0.15	0.2	12	13.640	0	13.640	30 x 1 = 30	409.200	0.888	363.370
									TOTAL FOR OUTLET APRON		**2147.607**

Station 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP	CUL. SLOP		BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.56499°	0.50877°		13.420	5.742
							0.5000	0.009			

Location	Bar Mark	Shape & Dimension	Spacing (m)	Size (mm)	Length (m)	Bend Deduction (m)	Cut Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
WING WALL (OUTLET)	A200	6.223	as	12	6.223	0	6.223	2 x 5 = 10	62.225	0.888	55.256
	B101-18Ø	0.15 ave =2.452 0.38 max =2.894 min =2.010	0.15	18	2.982	0	2.982	13 x 2 = 26	77.54	2.000	155.075
	B101-14Ø	0.15 ave =1.047 0.38 max =1.935 min =0.158	0.15	14	1.577	0	1.577	25 x 2 = 50	78.84	1.210	95.393
	C101	0.15 ave =1.526 0.24 max =2.894 min =0.158	0.15	12	1.916	0	1.916	38 x 2 = 76	145.64	0.888	129.324
	D101-16Ø	0.15 ave =2.452 0.32 max =2.894 min =2.010	0.15	16	2.922	0	2.922	13 x 6 = 78	227.93	1.580	360.133
	D101-14Ø	0.15 ave =1.047 0.32 max =1.935 min =0.158	0.15	14	1.517	0	1.517	25 x 6 = 150	227.51	1.210	275.290
	A101	ave =2.836 max =5.345 0.26 min =0.328	0.15	12	2.836	0	2.836	17 x 10 = 170	482.203	0.888	428.196
	A300	0.339 0.06 0.240 0.5	0.15	12	1.139	0	1.139	19 x 2 = 38	43.298	0.888	38.448
	B109	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B110	0.300 3.12	as	20	3.420	0	3.420	1 x 2 = 2	6.840	2.47	16.895
	B116	0.300 3.12	as	20	3.420	0	3.420	2 x 2 = 4	13.680	2.47	33.790
	C189	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	C190	0.300 3.12	as	12	3.420	0	3.420	1 x 2 = 2	6.840	0.888	6.074
	D135	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	D136	0.300 3.12	as	16	3.420	0	3.420	2 x 3 = 6	20.520	1.58	32.422
	E300	0.300 0.180 0.300	0.15	12	0.780	0	0.780	18 x 3 = 54	42.120	0.888	37.403
									TOTAL FOR OUTLET WING WALL		**1719.089**

Station 37+836.740 skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	SIDE SLOP			BARREL WIDTH X1	APRON LENGTH L1
4	3.00	2.50	0.36	0.32	0.32	0.26	26.565°			13.420	5.742
TOE WALL (OUTLET)	A205	13.340	as	14	13.340	0	13.340	20 x 1 = 20	266.800	1.21	322.828
	A204	0.150 0.670 1.800 0.170	0.15	14	4.590	0	4.590	90 x 1 = 90	413.100	1.21	499.851
									TOTAL FOR OUTLET TOE WALL		**822.679**

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF STEEL

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **50201 REINFORCING STEEL (Grade 60)** Drwg. No. _____

50201 REINFORCING STEEL (Grade 60)

Station 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60	47.852	13.420	13.420

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
	10	0.000	0.000
S100	12	219.514	5,022.418
E103		121.203	
W.W		4,681.701	
A	14	2,295.902	34,387.837
C		7,289.814	
D		5,174.347	
E		3,297.928	
F		1,163.052	
G		2,222.831	
LONG'L		9,650.457	
E102		68.631	
H302		318.169	
W.W		2,906.706	
B	16	4,172.148	5,930.210
H300		341.280	
E.J.		568.800	
W.W		847.982	
W.W	18	309.318	309.318
W.W	20	135.158	135.158
E101	22	873.736	873.736
H301	24	419.752	419.752
	25	0.000	0.000
		TOTAL WEIGHT =	**47,078.430**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	EDGE BEAM		BARREL DIMENSION		
NO.	S	H	T1	T2	W1	W2	WC	BB	LENGTH	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	0.200	0.60	47.852	13.420	13.420

LOCATION	FORMULA	VOLUME (m³)
TOP SLAB	Vol. = Length * X * T2	205.496
BOTTOM SLAB	Vol. = Length * X * T1	231.183
OUTER WALLS	Vol. = Length * H * 2W1	76.563
INNER WALLS	Vol. = Length * H * W2 * (Ncell-1)	93.311
PARAPETS	Vol. = WC * 0.10 * X * 0.50 * 2	0.268
END KEY	Vol. = XS * (0.40*2 + 0.10)/2 * 0.10 * 2	1.208
FILLETS	Vol. = Length * 0.05 * 0.05 *0.50 * 2 * Ncell	0.479
	TOTAL VOLUME =	**608.508**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF CONCRETE

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ___ of ____

Item : **5030308 CONCRETE FOR BOX CULVERT 270/20** Drwg. No. _____

5030308 CONCRETE FOR BOX CULVERT 270/20

Station 37+836.740 skew 90° Normal

TABLE 2

CELL	SPAN	HEIGHT	BOT.SLAB	TOP SLAB	EXT.WALL	INT.WALL	APRON DIMENSION			BARREL DIMENSION	
NO.	S	H	T1	T2	W1	W2	INLET (Li)	OUTLET (Lo)	THICKNESS (T)	X	xs
4	3.00	2.50	0.36	0.32	0.32	0.26	5.542	5.742	0.250	13.420	13.420

X2	SLOPE
0.29	2.000 : 1

LOCATION	FORMULA	VOLUME (m³)
APRON INLET	Vol. = Li * X * T	18.593
APRON OUTLET	Vol. = Lo * X * T	19.264
TOE WALL INLET	Vol. = XS * T * (1-T)	2.516
TOE WALL OUTLET	Vol. = XS * T * (2-T)	5.871
OUTER W.W. INLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.2) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Li-[0.10+(W1-X2)]}	3.912
OUTER W.W. OUTLET	Vol. = [W1*0.10*(H+T2)] + {(W1+X2)/2 * (W1-0.20) * [H+T2-(W1-X2)/2 * S]} + (X2+0.20)/2 * [H+T2-(W1-X2) * S]/2 * {Lo-[0.10+(W1-X2)]}	4.05
INNER W.W. INLET	Vol. = Li * (H+T2)/2 * W2 * (Ncell-1)	6.095
INNER W.W. OUTLET	Vol. = Lo * (H+T2)/2 * W2 * (Ncell-1)	6.315
KEY BLOCKS OUTER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 2	0.545
KEY BLOCKS OUTER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25)) * (W1 + 0.25) * 0.10 * 3	0.568
KEY BLOCKS INNER W.W. INLET	Vol.=(Li-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-1	0.803
KEY BLOCKS INNER W.W. OUTLET	Vol.=(Lo-T-0.4-(T1-0.25))*(W2+0.30)*0.10*(Ncell-	0.837
END KEY BLOCKS OUTER (INLET &	Vol.=XS*(0.40+(T1+0.10-T)/2)*(T1+0.1-T)*2	2.846
	TOTAL VOLUME =	**72.215**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

المزلقانات الإيرلندية

IRISH CROSSING TYPE A,B&C

AGRICULTURAL LINK ROADS IN ALBAHA

LINK NO: 7 , LINK NO:4 - Part 1 AND LINK NO:4 - Part 2

ESTIMATED OF QUANTITY OF CONCRETE,STEEL & GABION FOR IRISH CROSSING

Sl No	Station		Length of I.C	Type	Quantity of Concrete (m³)	Quantity of Steel (Kg)	Quantity of Gabion (m³)
	From	To					
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
				Total =	***0.000***	***0.000***	***0.000***

Consultant : Dar Al Handasah	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : Page: __1_ of _1_

Item : IRISH CROSSING - Type A Drwg. No. _____

Steel

QUANTITY OF STEEL

FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+128.000

LENGTH OF IRISH CROSSING = 128.000 [(4 x 30) + 8.000]

Bar Mark	Spacing	Size (mm)	Length (m)	No of Pieces	Total Length	Unit Wt. (Kg/m)	Weight (Kg)
For Length= 30							
A1	0.30	10	4.85	101	489.850	0.617	302.237
A2	0.30	10	5.85	101	590.850	0.617	364.554
A3	0.30	10	7.20	101	727.200	0.617	448.682
A4	0.30	10	31.10	57	1772.700	0.617	1093.756
						Weight of Steel for 30m =	*2209.230*
For Length= 8 m							
A1	0.30	10	4.85	27	130.950	0.617	80.796
A2	0.30	10	5.85	27	157.950	0.617	97.455
A3	0.30	10	7.20	27	194.400	0.617	119.945
A4	0.30	10	7.90	57	450.300	0.617	277.835
						Weight of Steel for this part=	*576.031*

Total Weight of steel = 4 x 2209.230 + 576.031 = 9412.952

Consultant : Dar Al Handasah		Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer	0	Quantity Surveyor Proj. Manager

Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
Dar Al Handasah	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	*M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : 0 Page: __1_ of _1_

Item : IRISH CROSSING - Type A Drwg. No. _____

Concrete

Gabions

QUANTITY OF CONCRETE					
Sl No	Station		Length (m)	Area/m (Type A)*	Total Volume of Concrete (m³)
	From	To			
1	0+000.000	0+128.000	128.000	2.415	309.12

*** Note:** Concrete for 'L' m length, = [(1.50+2.00)x0.25 + 10 x 0.15 + 0.40 x 2 x 0.05] x L

= [0.875 + 1.50 + 0.04] x L = 2.415 x L

QUANTITY OF GABION				
FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+128.000				
Side	Length	Width	Depth	Volume of Gabion (m³)
Up Stream	128.000	1.50	0.50	96.000
Down Stream	188.000	4.00	1.00	752.000
Total Quantity of Gabion =				*848.000*

Consultant :		Contractor :
Dar Al Handasah	*0*	*M. A. AL SWAILEM CO.*
Quantity Surve Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
SAUDI TECH	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

FINAL QUANTITIES
الكميات النهائية

Project : **ALBAHA AGRI. LINK ROADS (LINK # 7)** Page: __1_ of _1_

Item : **IRISH CROSSING (Type A)** Drwg. No. _____

Concrete , Steel & Gabion

Type: A

PLAN

Section A-A

A1 : L=5.85m

A2 : L=4.85m

A3 : L = 7.20

A4 : 57 x L

Suprv'g. Consultant :		Contractor :
SAUDI TECH	***ALBAHA AGRI. LINK ROADS (LINK # 7)***	***M. A. AL SWAILEM CO.***
Quantity Surve Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : Page: __1_ of _1_

Item : IRISH CROSSING - Type B Drwg. No. _____

Steel

QUANTITY OF STEEL

FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+050.000

LENGTH OF IRISH CROSSING = 50.000 [(1 x 30) + 20.000]

Bar Mark	Spacing	Size (mm)	Length (m)	No of Pieces	Total Length	Unit Wt. (Kg/m)	Weight (Kg)
For Length= 30							
A1	0.30	10	4.85	101	489.850	0.617	302.237
A2	0.30	10	3.85	101	388.850	0.617	239.920
A3	0.30	10	31.10	28	870.800	0.617	537.284
						Weight of Steel for 30m =	*1079.442*
For Length= 20 m							
A1	0.30	10	4.85	67	324.950	0.617	200.494
A2	0.30	10	3.85	67	257.950	0.617	159.155
A3	0.30	10	20.50	28	574.000	0.617	354.158
						Weight of Steel for this part=	*713.807*

Total Weight of steel = 1 x 1079.442 + 713.807 = 1793.249

Suprv'g. Consultant : 0	0	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
0	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : 0 Page: __1_ of _1_

Item : IRISH CROSSING - Type B Drwg. No. _____

Concrete

Gabions

QUANTITY OF CONCRETE					
Sl No	Station		Length (m)	Area/m (Type A)*	Total Volume of Concrete (m³)
	From	To			
1	0+000.000	0+050.000	50.000	1.15	57.5

*** Note:** Concrete for 'L' m length, = [((1+1.5)x0.25)+((2x2 - 0.25x2) x 0.15)] x L

= [0.625 + 0.525] x L = 1.150 x L

QUANTITY OF GABION				
FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+050.000				
Side	Length	Width	Depth	Volume of Gabion (m³)
Up Stream	50.000	1.50	0.50	37.500
Down Stream	110.000	3.00	1.00	330.000
Total Quantity of Gabion =				*367.500*

Consultant :		Contractor :
0	0	M. A. AL SWAILEM CO.
Quantity Surve Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
SAUDI TECH	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

FINAL QUANTITIES
الكميات النهائية

Project : **ALBAHA AGRI. LINK ROADS (LINK # 4 : Part 1)** Page: __1_ of _1_

Item : **IRISH CROSSING (Type B)** Drwg. No. _____

Concrete , Steel & Gabion

Suprv'g. Consultant :		Contractor :
SAUDI TECH	***ALBAHA AGRI. LINK ROADS (LINK # 4 : Part 1)***	***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : Page: __1_ of _1_

Item : IRISH CROSSING - Type C Drwg. No. _____

Steel

QUANTITY OF STEEL

FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+055.000

LENGTH OF IRISH CROSSING = 55.000 [(1 x 30) + 25.000]

Bar Mark	Spacing	Size (mm)	Length (m)	No of Pieces	Total Length	Unit Wt. (Kg/m)	Weight (Kg)
For Length= 30							
A1	0.30	10	3.85	101	388.850	0.617	239.920
A2	0.30	10	2.85	101	287.850	0.617	177.603
A3	0.30	10	31.10	22	684.200	0.617	422.151
						Weight of Steel for 30m =	*839.675*
For Length= 25 m							
A1	0.30	10	3.85	84	323.400	0.617	199.538
A2	0.30	10	2.85	84	239.400	0.617	147.710
A3	0.30	10	26.10	22	574.200	0.617	354.281
						Weight of Steel for this part=	*701.529*

Total Weight of steel = 1 x 839.675 + 701.529 = 1541.204

Suprv'g. Consultant : 0	0	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity SurveyorProj. Manager

Consultant : 0	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : 0 Page: __1_ of _1_

Item : IRISH CROSSING - Type C Drwg. No. _____

Concrete

Gabions

QUANTITY OF CONCRETE					
Sl No	Station		Length (m)	Area/m (Type A)*	Total Volume of Concrete (m³)
	From	To			
1	0+000.000	0+055.000	55.000	0.90	49.5

*** Note:** Concrete for 'L' m length, = [(0.50+1.00)x0.25 + (2x2 - 0.25x2) x 0.15] x L

= [0.375 + 0.525] x L = 0.90 x L

QUANTITY OF GABION				
FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+055.000				
Side	Length	Width	Depth	Volume of Gabion (m³)
Up Stream	55.000	1.50	0.50	41.250
Down Stream	115.000	2.00	0.50	115.000
Total Quantity of Gabion =				*156.250*

Consultant :		Contractor :
0	0	M. A. AL SWAILEM CO.
Quantity Surve Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
SAUDI TECH	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

FINAL QUANTITIES
الكميات النهائية

Project : **ALBAHA AGRI. LINK ROADS (LINK # 7)** Page: __1_ of _1_

Item : **IRISH CROSSING (Type C)** Drwg. No. _____

Concrete , Steel & Gabion

Suprv'g. Consultant :		Contractor :
SAUDI TECH	***ALBAHA AGRI. LINK ROADS (LINK # 7)***	***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : Page: __1_ of _1_

Item : IRISH CROSSING - Type D Drwg. No. _____

Steel

QUANTITY OF STEEL

FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+256.000

LENGTH OF IRISH CROSSING = 256.000 [(8 x 30) + 16.000]

Bar Mark	Spacing	Size (mm)	Length (m)	No of Pieces	Total Length	Unit Wt. (Kg/m)	Weight (Kg)
For Length= 30							
A1	0.30	10	0.90	101	90.900	0.617	56.085
A2	0.30	10	0.90	101	90.900	0.617	56.085
A3	0.30	10	31.10	10	311.000	0.617	191.887
						Weight of Steel for 30m =	*304.058*
For Length= 16 m							
A1	0.30	10	0.90	54	48.600	0.617	29.986
A2	0.30	10	0.90	54	48.600	0.617	29.986
A3	0.30	10	16.50	10	165.000	0.617	101.805
						Weight of Steel for this part=	*161.777*

Total Weight of steel = 8 x 304.058 + 161.777 = 2594.238

A1 = 0.90

A1 = 0.90

A2 = 5 x 2 = 10

Suprv'g. Consultant :		Contractor :
0	*0*	*M. A. AL SWAILEM CO.*
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Consultant : 0	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : 0 Page: __1_ of _1_

Item : IRISH CROSSING - Type D Drwg. No. _____

Concrete

Gabions

QUANTITY OF CONCRETE					
Sl No	Station		Length (m)	Area/m (Type A)*	Total Volume of Concrete (m³)
	From	To			
1	0+000.000	0+256.000	256.000	0.255	65.28

*** Note:** Concrete for 'L' m length, = [(0.50x2x0.15 - 0.15x0.15) x L x 2

= [0.15 - 0.225] x L x 2 = 0.255 x L

QUANTITY OF GABION				
FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+256.000				
Side	Length	Width	Depth	Volume of Gabion (m³)
Down Stream	316.000	2.00	0.50	316.000
Total Quantity of Gabion =				*316.000*

Consultant : 0	0	Contractor : M. A. AL SWAILEM CO.
Quantity Surve Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : Dar Al Handasah	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project :
Item :

Page: __1_ of _1_
Drwg. No. _____

QUANTITY OF CONCRETE

Sl No	Station From	Station To	Length (m)	Area/m (Type A)*	Total Volume of Concrete (m³)
1	1+800.000	1+950.000	150.000	2.415	362.25

*** Note:** Concrete for 'L' m length, = [(1.50+2.00)x0.25 + 10 x 0.15 + 0.40 x 2 x 0.05] x L
= [0.875 + 1.50 + 0.04] x L = 2.415 x L

QUANTITY OF STEEL

FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 2+000.000
LENGTH OF IRISH CROSSING = 2000.000

Sl No	Bar	Length of Bar	No. of Bars	Total Length	Wt. of Steel /m (Kg)	Total Weight (Kg)
1	A1	4.85	6667	32334.950	0.617	19950.664
2	A2	5.85	6667	39001.950	0.617	24064.203
3	A3	7.20	6667	48002.400	0.617	29617.481
4	A4	2099.50	57	119671.500	0.617	73837.316
					Total weight of Steel =	*147469.664*

QUANTITY OF GABION

FOR IRISH CROSSING FROM STA. 1+800.000 TO STA. 1+950.000

Side	Length	Width	Depth	Volume of Gabion (m³)
Up Stream	150.000	1.50	0.50	112.500
Down Stream	210.000	4.00	1.00	840.000
			Total Quantity of Gabion =	*952.500*

Suprv'g. Consultant : Dar Al Handasah		Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer	0	Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
SAUDI TECH	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : ALBAHA AGRI. LINK ROADS (LINK # 4 : Part 1) Page: __1_ of _1_

Item : IRISH CROSSING (Type B) Drwg. No. _____

Concrete , Steel & Gabion

QUANTITY OF CONCRETE

Sl No	Station From	Station To	Length (m)	Area/m (Type A)*	Total Volume of Concrete (m³)
1	5+300.000	5+350.000	50.000	1.15	57.500

*** Note:** Concrete for 'L' m length, = [((1+1.5)x0.25)+((2x2 - 0.25x2) x 0.15)] x L
= [0.625 + 0.525] x L = 1.150 x L

QUANTITY OF STEEL

FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+024.000

LENGTH OF IRISH CROSSING = 24.000

Sl No	Bar	Length of Bar	No. of Bars	Total Length	Wt. of Steel /m (Kg)	Total Weight (Kg)
1	A1	4.85	81	392.850	0.617	242.388
2	A2	3.85	81	311.850	0.617	192.411
3	A3	24.50	28	686.000	0.617	423.262
					Total weight of Steel =	*858.062*

QUANTITY OF GABION

FOR IRISH CROSSING FROM STA. 5+300.000 TO STA. 5+350.000

Side	Length	Width	Depth	Volume of Gabion (m³)
Up Stream	50.000	1.50	0.50	37.500
Down Stream	110.000	3.00	1.00	330.000
			Total Quantity of Gabion =	*367.500*

Suprv'g. Consultant :		Contractor :
SAUDI TECH	***ALBAHA AGRI. LINK ROADS (LINK # 4 : Part 1)***	***M. A. AL SWAILEM CO.***
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project :
Item :

Page: __1_ of _1_
Drwg. No. _____

QUANTITY OF CONCRETE

Sl No	Station From	Station To	Length (m)	Area/m (Type A)*	Total Volume of Concrete (m³)
1	8+850.000	8+950.000	100.000	0.90	*90.000*

*** Note:** Concrete for 'L' m length, = [(0.50+1.00)x0.25 + (2x2 - 0.25x2) x 0.15] x L
= [0.375 + 0.525] x L = 0.90 x L

QUANTITY OF STEEL

FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+025.000
LENGTH OF IRISH CROSSING = 25.000

Sl No	Bar	Length of Bar	No. of Bars	Total Length	Wt. of Steel /m (Kg)	Total Weight (Kg)
1	A1	3.85	84	323.400	0.617	199.538
2	A2	2.85	84	239.400	0.617	147.710
3	A3	26.10	22	574.200	0.617	354.281
					Total weight of Steel =	*701.529*

QUANTITY OF GABION

FOR IRISH CROSSING FROM STA. 8+850.000 TO STA. 8+950.000

Side	Length	Width	Depth	Volume of Gabion (m³)
Up Stream	100.000	1.50	0.50	75.000
Down Stream	160.000	2.00	0.50	160.000
			Total Quantity of Gabion =	*235.000*

Suprv'g. Consultant : *0* Quantity Surveyor Res. Engineer	*0*	Contractor : *M. A. AL SWAILEM CO.* Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
SAUDU TECH	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : ALBAHA AGRI. LINK ROADS (LINK # 7) Page: __1_ of _1_

Item : IRISH CROSSING (Type D) Drwg. No. _____

Concrete , Steel & Gabion

A1 = 0.90
A1 = 0.90
A2 = 5 x 2 = 10

QUANTITY OF CONCRETE

Sl No	Station From	Station To	Length (m)	Area/m (Type A)*	Total Volume of Concrete (m³)
1	24+275.000	24+325.000	50.000	0.255	12.750

*** Note:** Concrete for 'L' m length, = [(0.50x2x0.15 - 0.15x0.15) x L x 2
= [0.15 - 0.225] x L x 2 = 0.255 x L

QUANTITY OF STEEL

FOR IRISH CROSSING FROM STA. 0+000.000 TO STA. 0+256.000
LENGTH OF IRISH CROSSING = 256.000

Sl No	Bar	Length of Bar	No. of Bars	Total Length	Wt. of Steel /m	Total Weight (Kg)
1	A1	0.90	854	768.600	0.617	474.226
2	A2	0.90	854	768.600	0.617	474.226
3	A3	268.50	10	2685.000	0.617	1656.645
					Total weight of Steel =	*2605.097*

QUANTITY OF GABION

FOR IRISH CROSSING FROM STA. 24+275.000 TO STA. 24+325.000

Side	Length	Width	Depth	Volume of Gabion (m³)
Down Stream	50.000	2.00	0.50	50.000
			Total Quantity of Gabion =	***50.000***

Suprv'g. Consultant :		Contractor :
SAUDU TECH	***ALBAHA AGRI. LINK ROADS (LINK # 7)***	***M. A. AL SWAILEM CO.***
Quantity Surve Res. Engineer		Quantity Surveyor Proj. Manager

PLAN OF IRISH CROSSING
TYPE 'A'

SECTION B–B
DETAIL OF SLOPE PROTECTION

SECTION A–A

LONGITUDINAL SECTION
DETAIL OF CONTRACTION JOINT AT EVERY 10M

LONGITUDINAL SECTION
DETAIL OF EXPANSION JOINT AT EVERY 30M

NOTES:–
1– ALL DIMENSIONS ARE IN METERS.
2– FOR LONGITUDINAL SECTION AND NOTES SEE DRG. NO. 3/IC/4–R.

DETAIL – ⓧ

DETAIL – ⓩ

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وزارة النقل
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

KINGDOM OF SAUDI ARABIA
MINISTRY OF TRANSPORT

اسم المشروع :

الاستشاري :

المقاول : شركة محمد العلى السويلم

عنوان المخطط : IRISH CROSSING-TYPE A
DETAILS

موافقة الوزارة M.O.T

MRF-G-04		JULY 2002	NTS
SAJ	FAREED	FAREED	

PLAN OF IRISH CROSSING
TYPE 'B'

SECTION B–B
DETAIL OF SLOPE PROTECTION

LONGITUDINAL SECTION
DETAIL OF CONTRACTION JOINT AT EVERY 10M

LONGITUDINAL SECTION
DETAIL OF EXPANSION JOINT AT EVERY 30M

NOTES:–
1– ALL DIMENSIONS ARE IN METERS.
2– FOR LONGITUDINAL SECTION AND NOTES SEE DRG. NO. 3/IC/4–R.

SECTION A–A

DETAIL – Ⓧ

DETAIL – Ⓩ

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STUDY AND DESIGN DEPARTMENT

اسم المشروع :

الاستشاري :

المقاول : شركة محمد العلى السويلم

عنوان المخطط : IRISH CROSSING-TYPE B
DETAILS

موافقة الوزارة M.O.T

MRF-G-85		JULY 2002	NTS
SAJ	FAREED		

PLAN OF IRISH CROSSING
TYPE 'C'

SECTION B–B
DETAIL OF SLOPE PROTECTION

LONGITUDINAL SECTION
DETAIL OF CONTRACTION JOINT AT EVERY 10M

LONGITUDINAL SECTION
DETAIL OF EXPANSION JOINT AT EVERY 30M

NOTES:–
1– FOR LONGITUDINAL SECTION AND NOTES SEE DRG. NO. 3/IC/4–R.
2– ALL DIMENSIONS ARE IN METERS.

SECTION A–A

DETAIL – ⓧ

DETAIL – ⓩ

المملكة العربية السعودية
وزارة النقل
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

اسم المشروع :

الاستشاري :

المقاول :
شركة محمد العلي السويلم

عنوان المخطط :
IRISH CROSSING-TYPE C
DETAILS

موافقة الوزارة
M.O.T

MRF-PP-11		JULY 2002	N.T.S
SAJ	FAREED	FAREED	

LONGITUDINAL SECTION OF IRISH CROSSING

(APPLICABLE TO ALL TYPES OF IRISH CROSSING)
(A. B. C.)

NOTES:

- CROSS ROAD SLOPE AT IRISH CROSSING SHOULD BE WITH THE SAME SLOPE AND LEVEL OF WADI BED GUIDE LINES TO BE FOLLOWED FOR ROAD IN CURVE AT CROSSING.
- FOR MINIMZING SPEED OF TRAFFIC AT CROSSING REFER TO (H.D.M.) VOL.4 TCD-2 (TYPE-B).
- PROFILE OF ROAD AT IRISH CROSSING SHOULD BE ADJUSTED ACCORDING TO WHAT IS GIVEN IN LONGITUDINAL SECTION OF IRISH CROSSING, DISTANCE "L" SHOULD BE STRAICHT AND HORIZONAL AND SUITABLE VERTICAL CURVES TO BE ADJUSTED AT BOTH SIDES IN SLOPE PROTECTION REGION ACORDING TO H.W.L. AND PROFILE CONDITIONS. (IN CASE OF SQUE FLOW DISTANCE 'L' SHOULD BE STRAIGHT ON THE BATURAL BED LEVEL PROFILE IN MOUNTAINOUS AREAS CAN BE ADJUSTED ACCORDING TO GUIDE LINES AS ONE CURVE (L1=2L)
- SPECIAL CASES TO BE CONSIDERED SEPARATELY (ie DEEP WADIES. CROSSING THE ROAD AT SMALL ANGLE-ECT).
- HIGH DELINATORS TO BE PUT ON EACH SIDE OF I.C. AT EVERY 20m AS DETAILLED.
- ALL DIMENSIONS ARE IN METERS.
- THE COST OF CONCRETE TO BE COUNTED ACCORDING TO ITEM OF REINFORCED CONCRETE FOR SLOPE PROTECTION.

TABLE OF QUANTITIES FOR IRISH CROSSING

ITEMS / TYPE	MAIN IRISH CROSSING				SLOPE PROTECTION		
	CONC. m^3/M	ASPHALT m^3/M	LOOSE RIP RAP m^3/M		CONC. m^3/M	ASPHALT m^3/M	LOOSE RIP RAP m^3/M
A	2.415	0.325	4.75		0.85	0.95	4.00
B	1.150	0.650	3.75		0.85	0.95	3.00
C	0.900	0.650	1.75		0.85	0.95	1.00
D	0.255	0.425	1.00		–	–	–

- APLICABLE ONLY FOR AGRICULTURAL ROADS SEC. (1.5+6.5+1.5) WITH 5Cm ASPHALT
- DELINATORS ARE NOT INCLUDED.

TYPE Ⓓ TOUCH GRADE CROSSING

TABLE OF VELOCITY W.R.T. SLOPE & Hw

SLOPE \ Hw	0.5	0.4	0.3	0.2	0.15	0.1m
2%	3.8	3.0	2.5	1.9	1.6	1.3
1%	3.2	2.1	1.8	1.55	1.1	0.85
0.8%	2.0	1.9	1.6	1.3	1.0	0.75
0.6%	1.7	1.6	1.4	1.0	0.85	0.85
0.5%	1.6	1.5	1.25	0.95	0.8	0.60
0.4%	1.4	1.3	1.10	0.85	0.7	0.55
0.2%	1.0	0.9	0.90	0.8	0.8	0.35

i- 0.25 = HW x L x V m^3/Sec
ii- L = LENGTH OF Q/HwV IN METERS.
iii- L FOR TYPE-D TO BE INCREASED BY 20m.

DETAIL OF TOE WALL

PROFILE IN MOUNTAINOUS AREA

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STUDY AND DESIGN DEPARTMENT

KINGDOM OF SAUDI ARABIA
MINISTRY OF TRANSPORT

اسم المشروع :

الاستشاري :

المقاول :

شركة محمد العلى السويلم

عنوان المخطط :

IRISH CROSSING-TYPE D

DETAILS

موافقة الوزارة

M.O.T

MRF-G-17	JULY 2012	NTS

SUPERELEVATION DIAGRAM AND
CRITERIA FOR DETERMINATION OF RONOFF TRANSITION LENGTH

CASE I – TRANSITION NORMAL ROAD SECTION TO NATURAL SLOPE OF CHANNEL

CASE II – TRANSITION SUPERELEVATED SECTION TO NORMAL SLOPE OF CHANNEL (SAME SIDE)

CASE III – TRANSITION SUPERELEVATED SECTION TO NORMAL SLOPE OF CHANNEL (REVERSE SIDE)

LEGEND
S.E. = SUPERELEVATION IN m/m
S.c. = NATURAL SLOPE OF CHANNEL IN m/m
L = RUNOFF LENGTH

LONGITUDINAL SECTION
IRISH CROSSING
(CASE II–FOR SMALL WADI)
SCALE = NTS

NOTES:

1. ALL EXCAVATION BACK FILLING AND SLOPE PREPARATION OF ABOVE STRUCTURES SHALL NOT BE PAID FOR BUT WILL BE CONSIDERED AS SUBSIDIARY TO ITEMS OF RIP RAP OR SLOPE PROTECTION, GENERAL SPECIFICATION SECTION 6.07.
2. THICKNESS OF S.G. LAYER BENEATH THE IRISH CROSSING SHALL FOLLOW THE TYPICAL ROAD SECTION T–1

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KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

NAME OF PROJECT: اسم المشروع :

CONSULTANT: الاستشاري :

CONTRACTOR: المقاول :
شركة محمد العلى السويلم
MOH. A. AL-SWAILEM CO.

TITLE: عنوان المخطط :
DETAILS OF IRISH CROSSI NG

M.O.T موافقة الوزارة APPROVAL

STAMP :

DATE :

DRWG. NO.:		DATE :	SCALE:
MRF-G-08		JULY 2002	NTS
DRAWN	CHECKED	DESIGNED	APPROVED
SAJ	FAREED		

SEC. 6

البنود المتفرقة

PART : 6 INCIDENTAL CONSTRUTION

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S.O.L.
Animal Guard width = 8.34m.
1.67 shoulder
5.00 roadway
14 @ 0.4286 c/c = 6.00
Steel Rail(0.0045x0.05x0.10)
0.01 Expansion joint
21-BAR H(Stirrups) ø10 @ 100
30cm. thick stone mattress
SECTION A - A
R.O.W. FENCE @ 7.50m. interval
11 STEEL RAIL @ 0.184mm. Dist. c/c
PLAN VIEW OF TYPICAL INSTALLATION
WIDTH TRAFFIC GRID

SECTION B – B

SECTION C – C

General Notes:

1-ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE MINISTRY OF COMMUNICATION GENERAL SPECIFICATION FOR ROAD & BRIDGE CONSTRUCTION 1972 EDITION. LOCALLY MANUFACTURED PRODUCTS & MATERIALS SHALL BE USED TO BUILD THE ANIMAL GUARD.

2-ALL CONCRETE SHALL BE CLASS "A" = 250Kg/Cm^2.

3-REINFORCING STEEL SHALL CONFORM TO ASTM GRADE 60. REINFORCING BARS LONGER THAN 12.00 SHALL BE PROVIDED LAP SPLICE ACCORDING TO AASHTO.

4-THE BEARING CAPACITY OF THE SOIL BENEATH THE FOOTING LEVEL OF THE ABUTMENTS SHALL NOT BE LESS THAN 3 TONS/Ft.^{2} OR 2.93Kg/Cm^2.

5-REINF. CONC. ABUTMENT "I" BEAM SEATS SHALL BE CAST PARALLEL TO THE FINISHED PROFILE GRADE OF ROADWAY SURFACE IN SEC.

6-THE SUB STRUCTURE MAY BE CONSTRUCTED FROM PRECAST UNITS AFTER THE CONTRACTOR SUBMITS HIS PLANS TO THE ENGINEER FOR APPROVAL. DUE CARE SHALL BE TAKEN BY THE CONTRACTOR IN INSTALLING THE PRECAST ABUT. UNITS SO THAT NO DIFFERENTIAL SETTLEMENT WILL OCCUR AND ALSO THAT CORRECT LINES AND GRADES ARE MAINTAINED.

7-THE ENTIRE GRID OF "I" BEAMS AND STEEL RAILS SHALL BE PREFABRICATED SO THAT THE GRID IS KEPT IN A LEVEL PLANS. CARE SHALL BE TAKEN SO THAT SOWING UP OF THE SYSTEM IS NOT PERMITTED.

WING WALL ELEVATION

DETAIL A

STEEL TUBE RAIL DETAIL

0.05 X 0.10 X 0.0045 m.

BEARING PAD DETAIL

0.01 PLATE WEB
STIFFENER DETAIL

ISOMETRIC VIEW

TOP VIEW

TIES OF ANIMAL GRIDS I - BEAM

ANIMAL GUARD skew 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP T.	EXT.WALL	SIDE.-SLOP	BARREL WIDTH X1	Roadway+ Shldr. Wc	Apron Length La
1	1.91	1.151	0.20	0.364	0.20	14.03624°	2.310	8.340	4.860

Location	Bar Mark	Shape & Dimensions	Spacing (m)	Bar Size (mm)	Length (m)	No of Pieces	Total Length (m)	Unit Weight (kg/m)	Weight (kg)
BARREL	1	0.05; 1.615; 0.60; 1.105	0.15	14	3.370	58 x 2 = 116	390.920	1.21	473.013
	2	0.05; 0.670	0.15	12	0.720	58 x 2 = 116	83.520	0.888	74.166
	3	0.05; 1.251; 0.30	0.15	12	1.601	58 x 2 = 116	185.716	0.888	164.916
	4	0.13; 0.10; 0.230; 0.240; 0.136; 0.15	0.15	12	1.086	58 x 2 = 116	125.976	0.888	111.867
	5	8.540	0.15	10	8.540	34 x 2 = 68	580.720	0.617	358.304
	6	1.705; 0.10	0.15	14	1.805	58 x 2 = 116	209.380	1.21	253.350
OUTER WALL & APRON SLAB	7	1.415; 2.215	0.15	10	5.045	3 x 2 = 6	30.271	0.617	18.677
	7var.	ave.= 0.844; max = 1.377; 2.215; min = 0.311	0.15	10	3.904	31 x 2 = 62	242.020	0.617	149.326
	8	4.760	0.15	10	4.760	16 x 2 = 32	152.320	0.617	93.981
	9	4.760	0.15	10	4.760	2 x 4 = 8	38.080	0.617	23.495
	9var.	2.452; max = 4.160; min = 0.744	0.15	10	2.452	7 x 4 = 28	68.654	0.617	42.359
	10	0.344; 4.552; 0.311	0.15	10	5.207	1 x 4 = 4	20.827	0.617	12.851
END KEY	11	0.15; 0.17; 0.12; 0.15; 0.15	0.15	10	0.738	16 x 2 = 32	23.607	0.617	14.565
	12	2.210	AS	10	2.210	2 x 2 = 4	8.840	0.617	5.454
EDGE BEAM	13	2.210	AS	10	2.210	6 x 2 = 12	26.520	0.617	16.363
	14	0.300; 0.10; 0.10	0.11	10	1.000	21 x 2 = 42	42.000	0.617	25.914
	15	8.640	AS	14	8.640	6 x 2 = 12	103.680	1.21	125.453
								TOTAL =	**1964.054**

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF STEEL

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)
Item : 50201 REINFORCED STEEL (Grade 60)
ANIMAL GUARD

Page: ___ of ____
Drwg. No. _____

50201 REINFORCED STEEL (Grade 60)

Station 30+500.000 **skew** 90 °

CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP T.	EXT.WALL	SIDE.-SLOP	BARREL WIDTH X1	Roadway + Shldr. Wc	Apron Length La
1	1.91	1.151	0.20	0.364	0.20	14.03624°	2.310	8.340	4.860

BAR MARK	BAR SIZE (mm.)	WEIGHT / BM (kgs.)	WEIGHT / SIZE (kgs.)
5	10	358.304	402.986
7		168.003	
8		93.981	
9		65.855	
10		12.851	
11		14.565	
12		5.454	
13		16.363	
14		25.914	
2	12	74.166	350.948
3		164.916	
4		111.867	
1	14	473.013	851.816
6		253.350	
15		125.453	
		TOTAL WEIGHT =	**1,605.750**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF CONCRETE

Project : DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN) Page: ___ of ____

Item : 50202 REINFORCED CONCRETE (270/20) Drwg. No. _____

ANIMAL GUARD

50202 REINFORCED CONCRETE (270/20)

Station **30+500.000** **skew** **90 °**

							BARREL WIDTH	Roadway + Shldr.	Apron Length
CELL NO.	SPAN	HEIGHT	BOT.SLAB	TOP T.	EXT.WALL	SIDE.-SLOP	X1	Wc	La
1	1.91	1.151	0.20	0.364	0.20	14.03624 °	2.310	8.340	4.860

LOCATION	VOLUME FORMULA	VOLUME (m³)
BOTTOM SLAB	(L + 0.15*2) * X 1 * BS	3.992
EXT. WALL	((L+0.15*2) *(EW *H)+(TT*0.15)+(0.16 * (0.20+0.10/2))*2	5.613
EDGE BEAM	X1 * 0.35 * 0.15 * 2	0.243
END KEY	(0.20+0.10/2) * X1*2	0.116
APRON	X1 * La *0.10 * 2	2.245
WING WALL	{(H+TT-0.10)*0.4+(((H+TT-0.10)+0.30)/2)*(La-0.4)}*0.10*4	1.756
	TOTAL VOLUME =	**13.965**

Suprv'g. Consultant : ITAL CONSULT	DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor Contractor : ***M. A. AL SWAILEM CO.***

Project : **DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)** Page: ____ of ____

Item : **50201** **STRUCTURAL STEEL** Drwg. No. _____

ANIMAL GUARD

SPAN	HEIGHT	BOT.SLAB	TOP T.	EXT.WALL	SIDE.-SLOP	BARREL WIDTH X1	Roadway+ Shldr. Wc	Apron Length La
1.91	1.151	0.20	0.364	0.20	14.03624°	2.310	8.340	4.860

TRUCTUR	Shape & Dimensions	Spacing (m)	Length (m)	No of Pieces	Total Length (m)	Cross-sec. Area (m²)	Volume (m³)	Density (ton/m³)	Weight (kgs.)
I - BEAM		0.425	2.010	21	42.210	0.003144	0.133	7.85	1041.760
STEEL TUBE RAIL		0.184	8.340	12	100.080	0.001269	0.127	7.85	996.962
L - SHAPE STEEL BAR		AS	(Wc+X1-0.30) 10.350	2	20.700	0.000564	0.012	7.85	91.647
STEEL PLATE		AS	0.316	42	13.272	0.000076	0.001	7.85	7.918
PLATE WEB STIFFENER		AS	0.232	504	116.928	0.000138	0.016	7.85	126.668
MACHINE BOLT		AS	0.384	84	32.256	0.000201	0.006	7.85	50.895
ELASTOME-TRIC BEARING PAD		AS	0.200	42	8.400	AREA (m²) 1.260			
							TOTAL =		**2315.850**

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING JEDDAH-JIZAN ROAD (ADDARB JIZAN)***	Contractor Contractor : ***M. A. AL SWAILEM CO.***
Q. S. Res. Engineer		Qty. Surveyor Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : DOUBLING TAIF AL BAHA - ABHA ROAD — Page: __1_ of _1_
Item : 60703 CONCRTE CHUTE ON ROAD EMB. (FLUME & BUFFER) — Drwg. No. _____

60703 CONCRTE CHUTE ON ROAD EMB. (FLUME & BUFFER)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REF. PAGE
60703	CONCRTE CHUTE ON ROAD EMB. (FLUME & BUFFER)	M³	63.974	Page 1 of 2
	Grand total	M³	63.974	

Suprv'g. Consultant : ITAL CONSULT		DOUBLING TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

CONSULTANT: *ITAL CONSULT*	**KINGDOM OF SAUDI ARABIA** **Ministry of Transport** **GENERAL TECHNICAL ADMINISTRATION**	CONTRACTOR: *M. A. AL SWAILEM CO.*

Project: **DOUBLING TAIF AL BAHA - ABHA ROAD** Page No. 1 of 2

Item: **CONCRTE CHUTE ON ROAD EMB. (FLUME & BUFFER)** Drwng. No.

60703

No.	STATION	Side	Length (m)	No of Toe	COMPUTATIONS	VOLUME (m³)
1	354+960.000	Right	28.374	2	28.374 x 0.23 + 0.55 + 0.31 x 2	7.594
2	357+150.000	Right	26.31	2	26.310 x 0.23 + 0.55 + 0.31 x 2	7.126
3	357+660.000	Right	12.89	1	12.890 x 0.23 + 0.55 + 0.31 x 1	3.776
4	358+870.000	Right	23.387	2	23.387 x 0.23 + 0.55 + 0.31 x 2	6.464
5	360+875.000	Right	37.28	3	37.280 x 0.23 + 0.55 + 0.31 x 3	9.921
6	361+280.000	Right	13.84	1	13.840 x 0.23 + 0.55 + 0.31 x 1	3.992
7	361+830.000	Right	9.58	1	9.580 x 0.23 + 0.55 + 0.31 x 1	3.027
8	362+480.000	Right	28.22	2	28.220 x 0.23 + 0.55 + 0.31 x 2	7.559
9	364+200.000	Right	19.97	2	19.970 x 0.23 + 0.55 + 0.31 x 2	5.690
10	364+650.000	Right	18.94	2	18.940 x 0.23 + 0.55 + 0.31 x 2	5.457
11	364+650.000	Right	11.09	1	11.090 x 0.23 + 0.55 + 0.31 x 1	3.369
					Total =	**63.974**

CONSULTANT: *ITAL CONSULT*	**DOUBLING TAIF AL BAHA - ABHA ROAD**	CONTRACTOR: *M. A. AL SWAILEM CO.*
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Proj. Manager

CONSULTANT: *ITAL CONSULT*	**KINGDOM OF SAUDI ARABIA** **Ministry of Transport** **GENERAL TECHNICAL ADMINISTRATION**	CONTRACTOR: *M. A. AL SWAILEM CO.*

Project: **DOUBLING TAIF AL BAHA - ABHA ROAD**
Item: **CONCRTE CHUTE ON ROAD EMB. (FLUME & BUFFER)**
60703

Page No. 2 of 2
Drwng. No.

P L A N

Section A - A

Section B - B

Section C - C

LOCATION	Width	Height	Area	Length	Volume
Part A	1.24	0.3	0.227	L	0.227 x L
Part B	1.24	0.55	0.411	1.00	0.411
Part C	0.20	0.55	0.110	1.24	0.136
Part D	0.25	1.00	0.250	1.24	0.310
Total Volume = 0.23 x L + 0.55+ 0.31 x No.					

Note:

Provide toe wall or stub for every ten meter length of concrete chute.

CONSULTANT: *ITAL CONSULT*	**DOUBLING TAIF AL BAHA - ABHA ROAD**	CONTRACTOR: *M. A. AL SWAILEM CO.*
Qty. Surveyor / Res. Eng'r		Quantity Surveyor / Proj. Manager

GROUTED STONE RIB RAB حماية الميول بالأحجارة المغموسة بالمونة

60-50 TRANS

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : **6060202 - GSRP TRANSITION** Drwg. No. _____

FROM: STA. 50+725.000

TO: STA. 59+100.000

SUMMARY

No.	STATION		SIDE	DISTANCE	SECT'NAL AREA	TOTAL VOLUME
	FROM	TO		(m.)	(m²)	(m³)
1	50+725.000	50+750.000	Right	25.000	0.890	22.250
2	50+850.000	50+875.000	Right	25.000	0.798	19.956
3	50+875.000	50+900.000	Right	25.000	0.798	19.956
4	50+975.000	51+000.000	Right	25.000	0.894	22.353
5	51+350.000	51+375.000	Right	25.000	0.834	20.860
6	51+500.000	51+525.000	Right	25.000	0.982	24.541
7	51+650.000	51+675.000	Right	25.000	0.982	24.541
8	51+825.000	51+850.000	Right	25.000	0.894	22.353
9	52+225.000	52+250.000	Right	25.000	0.766	19.149
10	52+750.000	52+775.000	Right	25.000	0.949	23.720
11	53+575.000	53+600.000	Right	25.000	0.894	22.353
12	53+675.000	53+700.000	Right	25.000	0.787	19.671
13	54+000.000	54+025.000	Right	25.000	0.931	23.280
14	54+100.000	54+125.000	Right	25.000	0.949	23.720
15	55+725.000	55+750.000	Left	25.000	0.850	21.248
16	55+850.000	55+875.000	Left	25.000	0.784	19.593
17	56+325.000	56+350.000	Left	25.000	0.899	22.481
18	56+425.000	56+450.000	Left	25.000	0.913	22.830
19	57+450.000	57+475.000	Left	25.000	0.819	20.478
20	57+500.000	57+525.000	Left	25.000	0.826	20.657
21	57+775.000	57+800.000	Left	25.000	0.888	22.191
22	57+850.000	57+875.000	Left	25.000	0.897	22.419
23	58+875.000	58+900.000	Left	25.000	0.828	20.690
24	59+000.000	59+025.000	Left	25.000	0.783	19.581
25	59+000.000	59+025.000	Right	25.000	0.955	23.878
26	59+075.000	59+100.000	Right	25.000	0.945	23.622
				650.000	**Grand Total**	**568.370**

Contractor :		Suprv'g. Consultant :
M. A. AL SWAILEM CO.	***DOUBLING TAIF AL BAHA ABHA ROAD***	***ITAL CONSULT***

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.235	
A3 =	0.206	
At =	**1.539**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	50+725
To: Sta.	50+750
Total Length =	25.000 m
Ave.Sec'l Area =	0.890 m²
Total Volume =	**22.247** m³

RIGHT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	50+725	1589.916	-0.01339	* 13.800	1589.758	14.630	1589.757	17.293	1589.091	18.293	1588.841	13.800	1589.558	14.275	1589.558	18.244	1588.647
1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	50+750	1589.344	0.00130	* 13.800	1589.359	14.630	1589.293	14.650	1589.473	14.850	1589.473	15.100	1589.473	13.800	1589.159	14.806	1589.079

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	50+850
To: Sta.	50+875
Total Length =	25.000 m
Ave.Sec'l Area =	0.798 m²
Total Volume =	**19.956** m³

RIGHT SIDE

Cross Sectional Area

A1 =	0.098	
A2 =	1.052	
A3 =	0.206	
At =	**1.355**	m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	50+850	1587.214	0.04200	* 13.800	1587.710	14.630	1587.643	14.650	1587.823	14.850	1587.823	15.100	1587.823	13.800	1587.510	14.806	1587.429
1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	50+875	1586.721	0.02784	* 13.800	1587.050	14.630	1587.052	16.897	1586.485	17.897	1586.235	13.800	1586.850	14.275	1586.850	17.849	1586.041

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.052	
A3 =	0.206	
At =	**1.355**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	50+875
To: Sta.	50+900
Total Length =	25.000 m
Ave.Sec'l Area =	0.798 m²
Total Volume =	**19.956** m³

RIGHT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sinØ	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	50+875	1586.721	0.02784	* 13.800	1587.050	14.630	1587.052	16.897	1586.485	17.897	1586.235	13.800	1586.850	14.275	1586.850	17.849	1586.041
1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	50+900	1586.243	0.01134	* 13.800	1586.377	14.630	1586.310	14.650	1586.490	14.850	1586.490	15.100	1586.490	13.800	1586.177	14.806	1586.096

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

RIGHT SIDE

From: Sta.	50+975
To: Sta.	51+000
Total Length =	25.000 m
Ave.Sec'l Area =	0.894 m²
Total Volume =	**22.353** m³

Cross Sectional Area

A1 =	0.098	
A2 =	1.244	
A3 =	0.206	
At =	**1.547**	m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	50+975	1584.907	-0.01500	* 13.800	1584.730	14.630	1584.664	14.650	1584.844	14.850	1584.844	15.100	1584.844	13.800	1584.530	14.806	1584.450
1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+000	1584.493	-0.01500	* 13.800	1584.316	14.630	1584.315	17.311	1583.645	18.311	1583.395	13.800	1584.116	14.275	1584.116	18.262	1583.201

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.124	
A3 =	0.206	
At =	**1.428**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	51+350
To: Sta.	51+375
Total Length =	25.000 m
Ave.Sec'l Area =	0.834 m²
Total Volume =	**20.860** m³

RIGHT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin(	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+350	1579.941	0.00997	* 13.800	1580.059	14.630	1580.059	17.053	1579.454	18.053	1579.204	13.800	1579.859	14.275	1579.859	18.005	1579.010
1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+375	1579.641	0.00031	* 13.800	1579.645	14.630	1579.578	14.650	1579.758	14.850	1579.758	15.100	1579.758	13.800	1579.445	14.806	1579.364

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

RIGHT SIDE

From: Sta.	51+500
To: Sta.	51+525
Total Length =	25.000 m
Ave.Sec'l Area =	0.982 m²
Total Volume =	**24.541** m³

Cross Sectional Area

A1 =	0.098	
A2 =	1.419	
A3 =	0.206	
At =	**1.722**	m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+500	1578.143	-0.04400	* 13.800	1577.624	14.630	1577.557	14.650	1577.737	14.850	1577.737	15.100	1577.737	13.800	1577.424	14.806	1577.343
1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+525	1577.844	-0.04400	* 13.800	1577.325	14.630	1577.321	17.688	1576.557	18.688	1576.307	13.800	1577.125	14.275	1577.125	18.640	1576.113

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.419	
A3 =	0.206	
At =	**1.722**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	51+650
To: Sta.	51+675
Total Length =	25.000 m
Ave.Sec'l Area =	0.982 m²
Total Volume =	**24.541** m³

RIGHT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+650	1576.346	-0.04400	* 13.800	1575.827	14.630	1575.823	17.688	1575.059	18.688	1574.809	13.800	1575.627	14.275	1575.627	18.640	1574.615
1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+675	1576.046	-0.04400	* 13.800	1575.527	14.630	1575.460	14.650	1575.640	14.850	1575.640	15.100	1575.640	13.800	1575.327	14.806	1575.246

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

SECTION

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	51+825
To: Sta.	51+850
Total Length =	25.000 m
Ave.Sec'l Area =	0.894 m²
Total Volume =	**22.353** m³

RIGHT SIDE

SECTION

Cross Sectional Area

A1 =	0.098	
A2 =	1.244	
A3 =	0.206	
At =	**1.547**	m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+825	1574.249	-0.01500	* 13.800	1574.072	14.630	1574.006	14.650	1574.186	14.850	1574.186	15.100	1574.186	13.800	1573.872	14.806	1573.792
1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	51+850	1573.949	-0.01500	* 13.800	1573.772	14.630	1573.771	17.311	1573.101	18.311	1572.851	13.800	1573.572	14.275	1573.572	18.262	1572.657

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	0.987	
A3 =	0.206	
At =	**1.291**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	52+225
To: Sta.	52+250
Total Length =	25.000 m
Ave.Sec'l Area =	0.766 m²
Total Volume =	**19.149** m³

RIGHT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	52+225	1569.453	0.04600	* 13.800	1569.996	14.630	1569.999	16.758	1569.467	17.758	1569.217	13.800	1569.796	14.275	1569.796	17.710	1569.023
1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	52+250	1569.143	0.04600	* 13.800	1569.686	14.630	1569.619	14.650	1569.799	14.850	1569.799	15.100	1569.799	13.800	1569.486	14.806	1569.405

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

RIGHT SIDE

From: Sta.	52+750
To: Sta.	52+775
Total Length =	25.000 m
Ave.Sec'l Area =	0.949 m²
Total Volume =	**23.720** m³

Cross Sectional Area

A1 =	0.098	
A2 =	1.353	
A3 =	0.206	
At =	**1.657**	m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	52+750	1562.115	-0.03400	* 13.800	1561.714	14.630	1561.647	14.650	1561.827	14.850	1561.827	15.100	1561.827	13.800	1561.514	14.806	1561.433
1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	52+775	1561.760	-0.03400	* 13.800	1561.359	14.630	1561.356	17.547	1560.627	18.547	1560.377	13.800	1561.159	14.275	1561.159	18.498	1560.183

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.244	
A3 =	0.206	
At =	**1.547**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	53+575
To: Sta.	53+600
Total Length =	25.000 m
Ave.Sec'l Area =	0.894 m²
Total Volume =	**22.353** m³

RIGHT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	53+575	1550.415	-0.01500	* 13.800	1550.238	14.630	1550.237	17.311	1549.567	18.311	1549.317	13.800	1550.038	14.275	1550.038	18.262	1549.123
1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	53+600	1550.142	-0.00880	* 13.800	1550.038	14.630	1549.972	14.650	1550.152	14.850	1550.152	15.100	1550.152	13.800	1549.838	14.806	1549.758

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	53+675
To: Sta.	53+700
Total Length =	25.000 m
Ave.Sec'l Area =	0.787 m²
Total Volume =	**19.671** m³

RIGHT SIDE

Cross Sectional Area

A1 =	0.098	
A2 =	1.029	
A3 =	0.206	
At =	**1.333**	m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	53+675	1549.614	0.02339	* 13.800	1549.890	14.630	1549.824	14.650	1550.004	14.850	1550.004	15.100	1550.004	13.800	1549.690	14.806	1549.610
1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	53+700	1549.535	0.03400	* 13.800	1549.936	14.630	1549.939	16.848	1549.384	17.848	1549.134	13.800	1549.736	14.275	1549.736	17.800	1548.940

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.318	
A3 =	0.206	
At =	**1.621**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	54+000
To: Sta.	54+025
Total Length =	25.000 m
Ave.Sec'l Area =	0.931 m²
Total Volume =	**23.280** m³

RIGHT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	54+000	1551.243	-0.02823	* 13.800	1550.910	14.630	1550.908	17.471	1550.197	18.471	1549.947	13.800	1550.710	14.275	1550.710	18.422	1549.753
1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	54+025	1551.188	-0.03400	* 13.800	1550.787	14.630	1550.720	14.650	1550.900	14.850	1550.900	15.100	1550.900	13.800	1550.587	14.806	1550.506

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	54+100
To: Sta.	54+125
Total Length =	25.000 m
Ave.Sec'l Area =	0.949 m²
Total Volume =	**23.720** m³

RIGHT SIDE

Cross Sectional Area

A1 =	0.098	
A2 =	1.353	
A3 =	0.206	
At =	**1.657**	m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	54+100	1550.544	-0.03400	* 13.800	1550.143	14.630	1550.076	14.650	1550.256	14.850	1550.256	15.100	1550.256	13.800	1549.943	14.806	1549.862
1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	54+125	1550.283	-0.03400	* 13.800	1549.882	14.630	1549.879	17.547	1549.150	18.547	1548.900	13.800	1549.682	14.275	1549.682	18.498	1548.706

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.155	
A3 =	0.206	
At =	**1.459**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	55+725
To: Sta.	55+750
Total Length =	25.000 m
Ave.Sec'l Area =	0.850 m²
Total Volume =	**21.248** m³

LEFT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	9=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	17=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	55+725	1516.062	-0.00298	* 13.800	1516.097	14.630	1516.097	17.120	1515.475	18.120	1515.225	13.800	1515.897	14.275	1515.897	18.072	1515.031

1	2	3	4	5	6=314*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	55+750	1515.739	-0.00737	* 13.800	1515.826	14.630	1515.760	14.650	1515.940	14.850	1515.940	15.100	1515.940	13.800	1515.626	14.806	1515.546

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

SECTION

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	55+850
To: Sta.	55+875
Total Length =	25.000 m
Ave.Sec'l Area =	0.784 m²
Total Volume =	**19.593** m³

LEFT SIDE

SECTION

Cross Sectional Area

A1 =	0.098	
A2 =	1.023	
A3 =	0.206	
At =	**1.326**	m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	55+850	1514.448	-0.02937	* 13.800	1514.795	14.630	1514.728	14.650	1514.908	14.850	1514.908	15.100	1514.908	13.800	1514.595	14.806	1514.514
1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	55+875	1514.125	-0.03572	* 13.800	1514.546	14.630	1514.549	16.835	1513.998	17.835	1513.748	13.800	1514.346	14.275	1514.346	17.786	1513.554

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.254	
A3 =	0.206	
At =	**1.557**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	56+325
To: Sta.	56+350
Total Length =	25.000 m
Ave.Sec'l Area =	0.899 m²
Total Volume =	**22.481** m³

LEFT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	56+325	1508.312	0.01692	* 13.800	1508.112	14.630	1508.111	17.333	1507.435	18.333	1507.185	13.800	1507.912	14.275	1507.912	18.284	1506.991
1	2	3	4	5	6=314*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	56+350	1507.989	0.01987	* 13.800	1507.755	14.630	1507.688	14.650	1507.868	14.850	1507.868	15.100	1507.868	13.800	1507.555	14.806	1507.474

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	56+425
To: Sta.	56+450
Total Length =	25.000 m
Ave.Sec'l Area =	0.913 m²
Total Volume =	**22.830** m³

LEFT SIDE

Cross Sectional Area

A1 =	0.098	
A2 =	1.282	
A3 =	0.206	
At =	**1.585**	m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	56+425	1507.020	0.02200	* 13.800	1506.760	14.630	1506.694	14.650	1506.874	14.850	1506.874	15.100	1506.874	13.800	1506.560	14.806	1506.480
1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	56+450	1506.698	0.02200	* 13.800	1506.438	14.630	1506.437	17.393	1505.746	18.393	1505.496	13.800	1506.238	14.275	1506.238	18.345	1505.302

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.094	
A3 =	0.206	
At =	**1.397**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	57+450
To: Sta.	57+475
Total Length =	25.000 m
Ave.Sec'l Area =	0.819 m²
Total Volume =	**20.478** m³

LEFT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	57+450	1498.410	-0.01722	* 13.800	1498.613	14.630	1498.615	16.988	1498.025	17.988	1497.775	13.800	1498.413	14.275	1498.413	17.939	1497.581
1	2	3	4	5	6=314*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	57+475	1498.565	-0.01476	* 13.800	1498.739	14.630	1498.673	14.650	1498.853	14.850	1498.853	15.100	1498.853	13.800	1498.539	14.806	1498.459

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

SECTION

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	57+500
To: Sta.	57+525
Total Length =	25.000 m
Ave.Sec'l Area =	0.826 m²
Total Volume =	**20.657** m³

LEFT SIDE

SECTION

Cross Sectional Area

A1 =	0.098	
A2 =	1.108	
A3 =	0.206	
At =	**1.412**	m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	57+500	1498.732	-0.01427	* 13.800	1498.900	14.630	1498.834	14.650	1499.014	14.850	1499.014	15.100	1499.014	13.800	1498.700	14.806	1498.620
1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	57+525	1498.964	-0.01377	* 13.800	1499.126	14.630	1499.128	17.018	1498.530	18.018	1498.280	13.800	1498.926	14.275	1498.926	17.970	1498.086

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.231	
A3 =	0.206	
At =	**1.534**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	57+775
To: Sta.	57+800
Total Length =	25.000 m
Ave.Sec'l Area =	0.888 m²
Total Volume =	**22.191** m³

LEFT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	57+775	1504.561	0.01252	* 13.800	1504.413	14.630	1504.412	17.283	1503.749	18.283	1503.499	13.800	1504.213	14.275	1504.213	18.234	1503.305
1	2	3	4	5	6=314*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	57+800	1505.247	0.01475	* 13.800	1505.073	14.630	1505.007	14.650	1505.187	14.850	1505.187	15.100	1505.187	13.800	1504.873	14.806	1504.792

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	57+850
To: Sta.	57+875
Total Length =	25.000 m
Ave.Sec'l Area =	0.897 m²
Total Volume =	**22.419** m³

LEFT SIDE

Cross Sectional Area

A1 =	0.098	
A2 =	1.249	
A3 =	0.206	
At =	**1.553**	m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	57+850	1506.620	0.01600	* 13.800	1506.431	14.630	1506.365	14.650	1506.545	14.850	1506.545	15.100	1506.545	13.800	1506.231	14.806	1506.151
1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	57+875	1507.306	0.01600	* 13.800	1507.117	14.630	1507.116	17.322	1506.443	18.322	1506.193	13.800	1506.917	14.275	1506.917	18.274	1505.999

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.110	
A3 =	0.206	
At =	**1.414**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	58+875
To: Sta.	58+900
Total Length =	25.000 m
Ave.Sec'l Area =	0.828 m²
Total Volume =	**20.690** m³

LEFT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	58+875	1528.927	-0.01315	* 13.800	1529.082	14.630	1529.083	17.024	1528.485	18.024	1528.235	13.800	1528.882	14.275	1528.882	17.976	1528.041
1	2	3	4	5	6=314*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	58+900	1528.796	-0.02009	* 13.800	1529.033	14.630	1528.967	14.650	1529.147	14.850	1529.147	15.100	1529.147	13.800	1528.833	14.806	1528.753

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	59+000
To: Sta.	59+025
Total Length =	25.000 m
Ave.Sec'l Area =	0.783 m²
Total Volume =	**19.581** m³

LEFT SIDE

Cross Sectional Area

A1 =	0.098	
A2 =	1.022	
A3 =	0.206	
At =	**1.325**	m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	59+000	1527.738	-0.03600	* 13.800	1528.163	14.630	1528.096	14.650	1528.276	14.850	1528.276	15.100	1528.276	13.800	1527.963	14.806	1527.882
1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-.5*4	9=7+0.63/(0.25-4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sinØ	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	59+025	1527.339	-0.03600	* 13.800	1527.764	14.630	1527.767	16.833	1527.216	17.833	1526.966	13.800	1527.564	14.275	1527.564	17.784	1526.772

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.098	
A2 =	1.366	
A3 =	0.206	
At =	**1.669**	m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	59+000
To: Sta.	59+025
Total Length =	25.000 m
Ave.Sec'l Area =	0.955 m²
Total Volume =	**23.878** m³

RIGHT SIDE

Cross Sectional Area

= 0.241 m²

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	59+000	1527.738	-0.03600	* 13.800	1527.313	14.630	1527.310	17.574	1526.574	18.574	1526.324	13.800	1527.113	14.275	1527.113	18.525	1526.130
1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	59+025	1527.339	-0.03600	* 13.800	1526.914	14.630	1526.848	14.650	1527.028	14.850	1527.028	15.100	1527.028	13.800	1526.714	14.806	1526.634

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

= 0.241 m²

LOCATIONS OF GROUTED RIP-RAP GUTTER

From: Sta.	59+075
To: Sta.	59+100
Total Length =	25.000 m
Ave.Sec'l Area =	0.945 m²
Total Volume =	**23.622** m³

RIGHT SIDE

Cross Sectional Area

A1 =	0.098	
A2 =	1.345	
A3 =	0.206	
At =	**1.649**	m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+0.2	12=10	13=11+0.25	14=10	15=5	16=6-0.20	17=5+1.006	18=16-1.006*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	59+075	1526.382	-0.03600	* 13.800	1525.957	14.630	1525.891	14.650	1526.071	14.850	1526.071	15.100	1526.071	13.800	1525.757	14.806	1525.677
1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+.5*4	=7+0.63/(0.25+4	10=8-(9-7)*0.25	11=9+1	12=10-0.25	13=5	14=6-0.2	15=5+0.475	16=6-0.20	7=11-0.2*sin	18=12-0.2*sinØ
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	59+100	1525.822	-0.03275	* 13.800	1525.436	14.630	1525.433	17.530	1524.708	18.530	1524.458	13.800	1525.236	14.275	1525.236	18.481	1524.264

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : **CONCRETE DITCH LINING (GUTTER)** Drwg. No. _____

BALJORASHI AREA

FROM: STA. 966+300.000

TO: STA. 978+607.407

SUMMARY

No.	STATION		SIDE	DISTANCE	SURFACE AREA	TOTAL AREA
	FROM	TO		(m.)	(m² / m)	(m²)
1	966+500.000	966+775.000	Left	275.000	1.170	321.750
2	966+925.000	967+075.000	Left	150.000	1.170	175.500
3	967+300.000	967+325.000	Right	25.000	1.170	29.250
4	967+400.000	967+525.000	Right	125.000	1.170	146.250
5	967+725.000	967+900.000	Left	175.000	1.170	204.750
6	968+125.000	969+225.000	Right	1100.000	1.170	1287.000
7	969+375.000	969+750.000	Right	375.000	1.170	438.750
8	970+350.000	970+450.000	Left	100.000	1.170	117.000
9	971+100.000	971+325.000	Left	225.000	1.170	263.250
10	971+575.000	971+650.000	Left	75.000	1.170	87.750
11	971+975.000	972+100.000	Left	125.000	1.170	146.250
12	972+175.000	972+325.000	Left	150.000	1.170	175.500
13	972+600.000	972+650.000	Left	50.000	1.170	58.500
14	972+925.000	973+175.000	Left	250.000	1.170	292.500
15	973+900.000	973+925.000	Right	25.000	1.170	29.250
16	974+100.000	974+150.000	Left	50.000	1.170	58.500
17	974+150.000	974+175.000	Right	25.000	1.170	29.250
18	974+375.000	974+450.000	Right	75.000	1.170	87.750
19	974+875.000	974+900.000	Right	25.000	1.170	29.250
20	974+950.000	975+100.000	Right	150.000	1.170	175.500
21	975+225.000	975+275.000	Right	50.000	1.170	58.500
22	975+925.000	976+025.000	Left	100.000	1.170	117.000
23	976+650.000	976+800.000	Left	150.000	1.170	175.500
24	977+250.000	977+525.000	Right	275.000	1.170	321.750
25	978+075.000	978+125.000	Left	50.000	1.170	58.500
26	978+250.000	978+400.000	Left	150.000	1.170	175.500
				4,325.000	**Grand Total**	**5,060.250**

Contractor :		Suprv'g. Consultant :
M. A. AL SWAILEM CO.	***DOUBLING TAIF AL BAHA ABHA ROAD***	***ITAL CONSULT***

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	966+500
To: Sta.	966+775
Total Length =	275.00 m
Surface Area =	1.17 m² / m
Total Area =	**321.75** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	966+500	2249.365	0.053	* 13.800	2248.740	14.630	2248.673	14.650	2248.853	14.800	2248.853	15.100	2248.853	13.800	2248.590	14.763	2248.513
2	966+525	2251.519	0.053	* 13.800	2250.894	14.630	2250.827	14.650	2251.007	14.800	2251.007	15.100	2251.007	13.800	2250.744	14.763	2250.667
3	966+550	2253.673	0.053	* 13.800	2253.048	14.630	2252.981	14.650	2253.161	14.800	2253.161	15.100	2253.161	13.800	2252.898	14.763	2252.821
4	966+575	2255.817	0.053	* 13.800	2255.192	14.630	2255.125	14.650	2255.305	14.800	2255.305	15.100	2255.305	13.800	2255.042	14.763	2254.965
5	966+600	2257.64	0.053	* 13.800	2257.015	14.630	2256.948	14.650	2257.128	14.800	2257.128	15.100	2257.128	13.800	2256.865	14.763	2256.788
6	966+625	2259.3	0.053	* 13.800	2258.675	14.630	2258.608	14.650	2258.788	14.800	2258.788	15.100	2258.788	13.800	2258.525	14.763	2258.448
7	966+650	2261.279	0.053	* 13.800	2260.654	14.630	2260.587	14.650	2260.767	14.800	2260.767	15.100	2260.767	13.800	2260.504	14.763	2260.427
8	966+675	2263.3	0.0465	* 13.800	2262.751	14.630	2262.685	14.650	2262.865	14.800	2262.865	15.100	2262.865	13.800	2262.601	14.763	2262.524
9	966+700	2265.276	0.0272	* 13.800	2264.955	14.630	2264.889	14.650	2265.069	14.800	2265.069	15.100	2265.069	13.800	2264.805	14.763	2264.728
10	966+725	2267.128	0.00781	* 13.800	2267.036	14.630	2266.969	14.650	2267.149	14.800	2267.149	15.100	2267.149	13.800	2266.886	14.763	2266.809
11	966+750	2268.981	-0.011234	* 13.800	2269.114	14.630	2269.047	14.650	2269.227	14.800	2269.227	15.100	2269.227	13.800	2268.964	14.763	2268.887
12	966+775	2270.834	-0.03	* 13.800	2271.188	14.630	2271.122	14.650	2271.302	14.800	2271.302	15.100	2271.302	13.800	2271.038	14.763	2270.961

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	966+925
To: Sta.	967+075
Total Length =	150.00 m
Surface Area =	1.17 m² / m
Total Area =	**175.50** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	966+925	2280.553	-0.05180	* 13.800	2281.164	14.630	2281.098	14.650	2281.278	14.800	2281.278	15.100	2281.278	13.800	2281.014	14.763	2280.937
2	966+950	2282.046	-0.05180	* 13.800	2282.657	14.630	2282.591	14.650	2282.771	14.800	2282.771	15.100	2282.771	13.800	2282.507	14.763	2282.430
3	966+975	2283.54	-0.05173	* 13.800	2284.150	14.630	2284.084	14.650	2284.264	14.800	2284.264	15.100	2284.264	13.800	2284.000	14.763	2283.923
4	967+000	2284.982	-0.05150	* 13.800	2285.590	14.630	2285.523	14.650	2285.703	14.800	2285.703	15.100	2285.703	13.800	2285.440	14.763	2285.363
5	967+025	2286.296	-0.05129	* 13.800	2286.901	14.630	2286.835	14.650	2287.015	14.800	2287.015	15.100	2287.015	13.800	2286.751	14.763	2286.674
6	967+050	2287.483	-0.05107	* 13.800	2288.086	14.630	2288.019	14.650	2288.199	14.800	2288.199	15.100	2288.199	13.800	2287.936	14.763	2287.859
7	967+075	2288.543	-0.05084	* 13.800	2289.143	14.630	2289.077	14.650	2289.257	14.800	2289.257	15.100	2289.257	13.800	2288.993	14.763	2288.916
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	967+300
To: Sta.	967+325
Total Length =	25.00 m
Surface Area =	1.17 m² / m
Total Area =	**29.25** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	967+300	2292.341	-0.05000	* 13.800	2291.751	14.630	2291.685	14.650	2291.865	14.800	2291.865	15.100	2291.865	13.800	2291.601	14.763	2291.524
2	967+325	2292.125	-0.05000	* 13.800	2291.535	14.630	2291.469	14.650	2291.649	14.800	2291.649	15.100	2291.649	13.800	2291.385	14.763	2291.308
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	967+400
To: Sta.	967+525
Total Length =	125.00 m
Surface Area =	1.17 m² / m
Total Area =	**146.25** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	967+400	2290.714	-0.05000	* 13.800	2290.124	14.630	2290.058	14.650	2290.238	14.800	2290.238	15.100	2290.238	13.800	2289.974	14.763	2289.897
2	967+425	2289.988	-0.04461	* 13.800	2289.462	14.630	2289.395	14.650	2289.575	14.800	2289.575	15.100	2289.575	13.800	2289.312	14.763	2289.235
3	967+450	2289.163	-0.03104	* 13.800	2288.797	14.630	2288.730	14.650	2288.910	14.800	2288.910	15.100	2288.910	13.800	2288.647	14.763	2288.570
4	967+475	2288.329	-0.01742	* 13.800	2288.123	14.630	2288.057	14.650	2288.237	14.800	2288.237	15.100	2288.237	13.800	2287.973	14.763	2287.896
5	967+500	2287.496	-0.00381	* 13.800	2287.451	14.630	2287.385	14.650	2287.565	14.800	2287.565	15.100	2287.565	13.800	2287.301	14.763	2287.224
6	967+525	2286.663	0.01442	* 13.800	2286.833	14.630	2286.767	14.650	2286.947	14.800	2286.947	15.100	2286.947	13.800	2286.683	14.763	2286.606
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	967+725
To: Sta.	967+900
Total Length =	175.00 m
Surface Area =	1.17 m² / m
Total Area =	**204.75** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	967+725	2280.763	0.05400	* 13.800	2280.126	14.630	2280.059	14.650	2280.239	14.800	2280.239	15.100	2280.239	13.800	2279.976	14.763	2279.899
2	967+750	2279.884	0.05400	* 13.800	2279.247	14.630	2279.180	14.650	2279.360	14.800	2279.360	15.100	2279.360	13.800	2279.097	14.763	2279.020
3	967+775	2278.968	0.03525	* 13.800	2278.552	14.630	2278.486	14.650	2278.666	14.800	2278.666	15.100	2278.666	13.800	2278.402	14.763	2278.325
4	967+800	2278.049	0.01023	* 13.800	2277.928	14.630	2277.862	14.650	2278.042	14.800	2278.042	15.100	2278.042	13.800	2277.778	14.763	2277.701
5	967+825	2277.134	-0.01368	* 13.800	2277.295	14.630	2277.229	14.650	2277.409	14.800	2277.409	15.100	2277.409	13.800	2277.145	14.763	2277.068
6	967+850	2276.76	-0.02346	* 13.800	2277.037	14.630	2276.970	14.650	2277.150	14.800	2277.150	15.100	2277.150	13.800	2276.887	14.763	2276.810
7	967+875	2276.265	-0.03684	* 13.800	2276.700	14.630	2276.633	14.650	2276.813	14.800	2276.813	15.100	2276.813	13.800	2276.550	14.763	2276.473
8	967+900	2275.454	-0.046	* 13.800	2275.997	14.630	2275.930	14.650	2276.110	14.800	2276.110	15.100	2276.110	13.800	2275.847	14.763	2275.770
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	968+125
To: Sta.	969+225
Total Length =	1100.00 m
Surface Area =	1.17 m² / m
Total Area =	**1287.00** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	968+125	2265.087	0.05332	* 12.980	2265.716	13.810	2265.650	13.830	2265.830	13.980	2265.830	14.280	2265.830	12.980	2265.566	13.943	2265.489
2	968+150	2263.658	0.05450	* 12.707	2264.301	13.537	2264.235	13.557	2264.415	13.707	2264.415	14.007	2264.415	12.707	2264.151	13.670	2264.074
3	968+175	2262.157	0.05450	* 12.433	2262.800	13.263	2262.734	13.283	2262.914	13.433	2262.914	13.733	2262.914	12.433	2262.650	13.396	2262.573
4	968+200	2260.583	0.05390	* 12.160	2261.219	12.990	2261.153	13.010	2261.333	13.160	2261.333	13.460	2261.333	12.160	2261.069	13.123	2260.992
5	968+225	2258.935	0.05292	* 12.160	2259.559	12.990	2259.493	13.010	2259.673	13.160	2259.673	13.460	2259.673	12.160	2259.409	13.123	2259.332
6	968+250	2257.215	0.05194	* 12.160	2257.828	12.990	2257.761	13.010	2257.941	13.160	2257.941	13.460	2257.941	12.160	2257.678	13.123	2257.601
7	968+275	2255.421	0.05095	* 12.160	2256.022	12.990	2255.956	13.010	2256.136	13.160	2256.136	13.460	2256.136	12.160	2255.872	13.123	2255.795
8	968+300	2253.592	0.0505	* 12.160	2254.188	12.990	2254.122	13.010	2254.302	13.160	2254.302	13.460	2254.302	12.160	2254.038	13.123	2253.961
9	968+325	2251.763	0.0505	* 12.160	2252.359	12.990	2252.293	13.010	2252.473	13.160	2252.473	13.460	2252.473	12.160	2252.209	13.123	2252.132
10	968+350	2249.934	0.0505	* 12.160	2250.530	12.990	2250.464	13.010	2250.644	13.160	2250.644	13.460	2250.644	12.160	2250.380	13.123	2250.303
11	968+375	2248.104	0.0505	* 12.160	2248.700	12.990	2248.634	13.010	2248.814	13.160	2248.814	13.460	2248.814	12.160	2248.550	13.123	2248.473
12	968+400	2246.276	0.035478	* 12.160	2246.695	12.990	2246.628	13.010	2246.808	13.160	2246.808	13.460	2246.808	12.160	2246.545	13.123	2246.468
13	968+425	2244.496	0.0181835	* 12.160	2244.711	12.990	2244.644	13.010	2244.824	13.160	2244.824	13.460	2244.824	12.160	2244.561	13.123	2244.484
14	968+450	2242.717	-0.007512	* 12.160	2242.628	12.990	2242.562	13.010	2242.742	13.160	2242.742	13.460	2242.742	12.160	2242.478	13.123	2242.401
15	968+475	2240.937	-0.026978	* 12.160	2240.619	12.990	2240.552	13.010	2240.732	13.160	2240.732	13.460	2240.732	12.160	2240.469	13.123	2240.392

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	968+125
To: Sta.	969+225
Total Length =	1100.00 m
Surface Area =	1.17 m² / m
Total Area =	**1287.00** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
16	968+500	2239.158	-0.04342	* 12.160	2238.646	12.990	2238.579	13.010	2238.759	13.160	2238.759	13.460	2238.759	12.160	2238.496	13.123	2238.419
17	968+525	2237.378	-0.04800	* 12.160	2236.812	12.990	2236.745	13.010	2236.925	13.160	2236.925	13.460	2236.925	12.160	2236.662	13.123	2236.585
18	968+550	2235.597	-0.04800	* 12.160	2235.031	12.990	2234.964	13.010	2235.144	13.160	2235.144	13.460	2235.144	12.160	2234.881	13.123	2234.804
19	968+575	2233.733	-0.04800	* 12.160	2233.167	12.990	2233.100	13.010	2233.280	13.160	2233.280	13.460	2233.280	12.160	2233.017	13.123	2232.940
20	968+600	2231.878	-0.04800	* 12.160	2231.312	12.990	2231.245	13.010	2231.425	13.160	2231.425	13.460	2231.425	12.160	2231.162	13.123	2231.085
21	968+625	2230.039	-0.02577	* 12.160	2229.735	12.990	2229.669	13.010	2229.849	13.160	2229.849	13.460	2229.849	12.160	2229.585	13.123	2229.508
22	968+631.313	2229.565	-0.01749	* 12.160	2229.359	12.990	2229.292	13.010	2229.472	13.160	2229.472	13.460	2229.472	12.160	2229.209	13.123	2229.132
23	968631.483	2229.565	-0.017485	* 12.160	2229.359	12.990	2229.292	13.010	2229.472	13.160	2229.472	13.460	2229.472	12.160	2229.209	13.123	2229.132
24	968+650	2228.203	0.0045246	* 12.160	2228.256	12.990	2228.190	13.010	2228.370	13.160	2228.370	13.460	2228.370	12.160	2228.106	13.123	2228.029
25	968+675	2226.396	0.029796	* 12.160	2226.748	12.990	2226.681	13.010	2226.861	13.160	2226.861	13.460	2226.861	12.160	2226.598	13.123	2226.521
26	968+700	2224.605	0.03879	* 12.160	2225.063	12.990	2224.996	13.010	2225.176	13.160	2225.176	13.460	2225.176	12.160	2224.913	13.123	2224.836
27	968+725	2222.83	0.03879	* 12.160	2223.288	12.990	2223.221	13.010	2223.401	13.160	2223.401	13.460	2223.401	12.160	2223.138	13.123	2223.061
28	968+750	2221.07	0.03879	* 12.160	2221.528	12.990	2221.461	13.010	2221.641	13.160	2221.641	13.460	2221.641	12.160	2221.378	13.123	2221.301
29	968+775	2219.327	0.03879	* 12.160	2219.785	12.990	2219.718	13.010	2219.898	13.160	2219.898	13.460	2219.898	12.160	2219.635	13.123	2219.558
30	968+800	2217.596	0.0311627	* 12.160	2217.964	12.990	2217.897	13.010	2218.077	13.160	2218.077	13.460	2218.077	12.160	2217.814	13.123	2217.737

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	968+125
To: Sta.	969+225
Total Length =	1100.00 m
Surface Area =	1.17 m² / m
Total Area =	**1287.00** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
31	968+825	2215.866	0.01788	* 12.160	2216.077	12.990	2216.011	13.010	2216.191	13.160	2216.191	13.460	2216.191	12.160	2215.927	13.123	2215.850
32	968+850	2214.1365	-0.00124	* 12.160	2214.122	12.990	2214.055	13.010	2214.235	13.160	2214.235	13.460	2214.235	12.160	2213.972	13.123	2213.895
33	968+875	2212.407	-0.02041	* 12.160	2212.166	12.990	2212.100	13.010	2212.280	13.160	2212.280	13.460	2212.280	12.160	2212.016	13.123	2211.939
34	968+900	2210.677	-0.03651	* 12.160	2210.246	12.990	2210.180	13.010	2210.360	13.160	2210.360	13.460	2210.360	12.160	2210.096	13.123	2210.019
35	968+925	2208.948	-0.04700	* 12.160	2208.393	12.990	2208.327	13.010	2208.507	13.160	2208.507	13.460	2208.507	12.160	2208.243	13.123	2208.166
36	968+950	2207.218	-0.04700	* 12.160	2206.663	12.990	2206.597	13.010	2206.777	13.160	2206.777	13.460	2206.777	12.160	2206.513	13.123	2206.436
37	968+975	2205.489	-0.04700	* 12.160	2204.934	12.990	2204.868	13.010	2205.048	13.160	2205.048	13.460	2205.048	12.160	2204.784	13.123	2204.707
38	969+000	2203.759	-0.047	* 12.160	2203.204	12.990	2203.138	13.010	2203.318	13.160	2203.318	13.460	2203.318	12.160	2203.054	13.123	2202.977
39	969+025	2202.03	-0.047	* 12.160	2201.475	12.990	2201.409	13.010	2201.589	13.160	2201.589	13.460	2201.589	12.160	2201.325	13.123	2201.248
40	969+050	2200.3	-0.047	* 12.160	2199.745	12.990	2199.679	13.010	2199.859	13.160	2199.859	13.460	2199.859	12.160	2199.595	13.123	2199.518
41	969+075	2198.57	-0.047	* 12.160	2198.015	12.990	2197.949	13.010	2198.129	13.160	2198.129	13.460	2198.129	12.160	2197.865	13.123	2197.788
42	969+100	2196.841	-0.047	* 12.160	2196.286	12.990	2196.220	13.010	2196.400	13.160	2196.400	13.460	2196.400	12.160	2196.136	13.123	2196.059
43	969+125	2195.111	-0.047	* 12.160	2194.556	12.990	2194.490	13.010	2194.670	13.160	2194.670	13.460	2194.670	12.160	2194.406	13.123	2194.329
44	969+150	2193.382	-0.04694	* 12.160	2192.828	12.990	2192.762	13.010	2192.942	13.160	2192.942	13.460	2192.942	12.160	2192.678	13.123	2192.601
45	969+175	2191.652	-0.030847	* 12.160	2191.288	12.990	2191.222	13.010	2191.402	13.160	2191.402	13.460	2191.402	12.160	2191.138	13.123	2191.061

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	968+125
To: Sta.	969+225
Total Length =	1100.00 m
Surface Area =	1.17 m² / m
Total Area =	**1287.00** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
46	969+200	2189.923	-0.01500	* 12.160	2189.746	12.990	2189.680	13.010	2189.860	13.160	2189.860	13.460	2189.860	12.160	2189.596	13.123	2189.519
47	969+225	2188.193	-0.01500	* 12.160	2188.016	12.990	2187.950	13.010	2188.130	13.160	2188.130	13.460	2188.130	12.160	2187.866	13.123	2187.789

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	969+375
To: Sta.	969+750
Total Length =	375.00 m
Surface Area =	1.17 m² / m
Total Area =	**438.75** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	969+375	2178.424	0.04358	* 12.160	2178.938	12.990	2178.872	13.010	2179.052	13.160	2179.052	13.460	2179.052	12.160	2178.788	13.123	2178.711
2	969+400	2176.802	0.05175	* 12.160	2177.413	12.990	2177.346	13.010	2177.526	13.160	2177.526	13.460	2177.526	12.160	2177.263	13.123	2177.186
3	969+425	2175.18	0.05175	* 12.160	2175.791	12.990	2175.724	13.010	2175.904	13.160	2175.904	13.460	2175.904	12.160	2175.641	13.123	2175.564
4	969+450	2173.558	0.03554	* 12.160	2173.977	12.990	2173.911	13.010	2174.091	13.160	2174.091	13.460	2174.091	12.160	2173.827	13.123	2173.750
5	969+475	2171.932	0.01191	* 12.160	2172.073	12.990	2172.006	13.010	2172.186	13.160	2172.186	13.460	2172.186	12.160	2171.923	13.123	2171.845
6	969+500	2170.279	-0.02059	* 12.160	2170.036	12.990	2169.970	13.010	2170.150	13.160	2170.150	13.460	2170.150	12.160	2169.886	13.123	2169.809
7	969+525	2168.596	-0.05050	* 12.160	2168.000	12.990	2167.934	13.010	2168.114	13.160	2168.114	13.460	2168.114	12.160	2167.850	13.123	2167.773
8	969+550	2166.883	-0.044164	* 12.160	2166.362	12.990	2166.295	13.010	2166.475	13.160	2166.475	13.460	2166.475	12.160	2166.212	13.123	2166.135
9	969+575	2165.139	-0.026869	* 12.160	2164.822	12.990	2164.756	13.010	2164.936	13.160	2164.936	13.460	2164.936	12.160	2164.672	13.123	2164.595
10	969+600	2163.365	-0.002963	* 12.160	2163.330	12.990	2163.264	13.010	2163.444	13.160	2163.444	13.460	2163.444	12.160	2163.180	13.123	2163.103
11	969+625	2161.56	0.025706	* 12.160	2161.863	12.990	2161.797	13.010	2161.977	13.160	2161.977	13.460	2161.977	12.160	2161.713	13.123	2161.636
12	969+650	2159.725	0.0458338	* 12.160	2160.266	12.990	2160.199	13.010	2160.379	13.160	2160.379	13.460	2160.379	12.160	2160.116	13.123	2160.039
13	969+675	2157.86	0.0588	* 12.160	2158.554	12.990	2158.487	13.010	2158.667	13.160	2158.667	13.460	2158.667	12.160	2158.404	13.123	2158.327
14	969+700	2155.964	0.0588	* 12.160	2156.658	12.990	2156.591	13.010	2156.771	13.160	2156.771	13.460	2156.771	12.160	2156.508	13.123	2156.431
15	969+725	2154.041	0.0588	* 12.160	2154.735	12.990	2154.668	13.010	2154.848	13.160	2154.848	13.460	2154.848	12.160	2154.585	13.123	2154.508
16	969+750	2152.112	0.0588	* 12.160	2152.806	12.990	2152.739	13.010	2152.919	13.160	2152.919	13.460	2152.919	12.160	2152.656	13.123	2152.579

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	970+350
To: Sta.	970+450
Total Length =	100.00 m
Surface Area =	1.17 m² / m
Total Area =	**117.00** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	970+350	2147.611	0.00221	* 13.800	2147.585	14.630	2147.519	14.650	2147.699	14.800	2147.699	15.100	2147.699	13.800	2147.435	14.763	2147.358
2	970+375	2147.811	0.01644	* 13.800	2147.617	14.630	2147.551	14.650	2147.731	14.800	2147.731	15.100	2147.731	13.800	2147.467	14.763	2147.390
3	970+400	2147.959	0.03254	* 13.800	2147.575	14.630	2147.509	14.650	2147.689	14.800	2147.689	15.100	2147.689	13.800	2147.425	14.763	2147.348
4	970+425	2148.056	0.04700	* 13.800	2147.501	14.630	2147.435	14.650	2147.615	14.800	2147.615	15.100	2147.615	13.800	2147.351	14.763	2147.274
5	970+450	2148.101	0.04700	* 13.800	2147.546	14.630	2147.480	14.650	2147.660	14.800	2147.660	15.100	2147.660	13.800	2147.396	14.763	2147.319
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	971+100
To: Sta.	971+325
Total Length =	225.00 m
Surface Area =	1.17 m² / m
Total Area =	**263.25** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	971+100	2144.311	0.04144	* 13.800	2143.822	14.630	2143.756	14.650	2143.936	14.800	2143.936	15.100	2143.936	13.800	2143.672	14.763	2143.595
2	971+125	2144.102	0.02722	* 13.800	2143.781	14.630	2143.714	14.650	2143.894	14.800	2143.894	15.100	2143.894	13.800	2143.631	14.763	2143.554
3	971+150	2143.838	0.01500	* 13.800	2143.661	14.630	2143.595	14.650	2143.775	14.800	2143.775	15.100	2143.775	13.800	2143.511	14.763	2143.434
4	971+175	2143.519	0.01348	* 13.800	2143.360	14.630	2143.294	14.650	2143.474	14.800	2143.474	15.100	2143.474	13.800	2143.210	14.763	2143.133
5	971+200	2143.468	-0.01500	* 13.800	2143.645	14.630	2143.579	14.650	2143.759	14.800	2143.759	15.100	2143.759	13.800	2143.495	14.763	2143.418
6	971+225	2142.72	-0.01824	* 13.800	2142.935	14.630	2142.869	14.650	2143.049	14.800	2143.049	15.100	2143.049	13.800	2142.785	14.763	2142.708
7	971+250	2142.238	-0.03279	* 13.800	2142.625	14.630	2142.559	14.650	2142.739	14.800	2142.739	15.100	2142.739	13.800	2142.475	14.763	2142.398
8	971+275	2141.703	-0.04250	* 13.800	2142.205	14.630	2142.138	14.650	2142.318	14.800	2142.318	15.100	2142.318	13.800	2142.055	14.763	2141.977
9	971+300	2141.113	-0.04250	* 13.800	2141.615	14.630	2141.548	14.650	2141.728	14.800	2141.728	15.100	2141.728	13.800	2141.465	14.763	2141.387
10	971+325	2140.468	-0.04250	* 13.800	2140.970	14.630	2140.903	14.650	2141.083	14.800	2141.083	15.100	2141.083	13.800	2140.820	14.763	2140.742
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	971+575
To: Sta.	971+650
Total Length =	75.00 m
Surface Area =	1.17 m² / m
Total Area =	**87.75** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	971+575	2131.362	0.05550	* 13.800	2130.707	14.630	2130.641	14.650	2130.821	14.800	2130.821	15.100	2130.821	13.800	2130.557	14.763	2130.480
2	971+600	2130.479	0.05550	* 13.800	2129.824	14.630	2129.758	14.650	2129.938	14.800	2129.938	15.100	2129.938	13.800	2129.674	14.763	2129.597
3	971+625	2129.851	0.05550	* 13.800	2129.196	14.630	2129.130	14.650	2129.310	14.800	2129.310	15.100	2129.310	13.800	2129.046	14.763	2128.969
4	971+650	2129.478	0.05550	* 13.800	2128.823	14.630	2128.757	14.650	2128.937	14.800	2128.937	15.100	2128.937	13.800	2128.673	14.763	2128.596
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	971+975
To: Sta.	972+100
Total Length =	125.00 m
Surface Area =	1.17 m² / m
Total Area =	**146.25** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	971+975	2146.165	-0.02117	* 13.800	2146.415	14.630	2146.348	14.650	2146.528	14.800	2146.528	15.100	2146.528	13.800	2146.265	14.763	2146.188
2	972+000	2148.213	-0.00307	* 13.800	2148.249	14.630	2148.183	14.650	2148.363	14.800	2148.363	15.100	2148.363	13.800	2148.099	14.763	2148.022
3	972+025	2150.202	0.01810	* 13.800	2149.988	14.630	2149.922	14.650	2150.102	14.800	2150.102	15.100	2150.102	13.800	2149.838	14.763	2149.761
4	972+050	2152.139	0.03864	* 13.800	2151.683	14.630	2151.617	14.650	2151.797	14.800	2151.797	15.100	2151.797	13.800	2151.533	14.763	2151.456
5	972+075	2154.066	0.05919	* 13.800	2153.368	14.630	2153.301	14.650	2153.481	14.800	2153.481	15.100	2153.481	13.800	2153.218	14.763	2153.140
6	972+100	2156.002	0.06000	* 13.800	2155.294	14.630	2155.228	14.650	2155.408	14.800	2155.408	15.100	2155.408	13.800	2155.144	14.763	2155.067
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	972+175
To: Sta.	972+325
Total Length =	150.00 m
Surface Area =	1.17 m² / m
Total Area =	**175.50** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	972+175	2162.149	0.06000	* 13.800	2161.441	14.630	2161.375	14.650	2161.555	14.800	2161.555	15.100	2161.555	13.800	2161.291	14.763	2161.214
2	972+200	2164.273	0.06000	* 13.800	2163.565	14.630	2163.499	14.650	2163.679	14.800	2163.679	15.100	2163.679	13.800	2163.415	14.763	2163.338
3	972+225	2166.479	0.06000	* 13.800	2165.771	14.630	2165.705	14.650	2165.885	14.800	2165.885	15.100	2165.885	13.800	2165.621	14.763	2165.544
4	972+250	2169.091	0.06000	* 13.800	2168.383	14.630	2168.317	14.650	2168.497	14.800	2168.497	15.100	2168.497	13.800	2168.233	14.763	2168.156
5	972+275	2171.351	0.06000	* 13.800	2170.643	14.630	2170.577	14.650	2170.757	14.800	2170.757	15.100	2170.757	13.800	2170.493	14.763	2170.416
6	972+300	2173.539	0.06000	* 13.800	2172.831	14.630	2172.765	14.650	2172.945	14.800	2172.945	15.100	2172.945	13.800	2172.681	14.763	2172.604
7	972+325	2175.728	0.06000	* 13.800	2175.020	14.630	2174.954	14.650	2175.134	14.800	2175.134	15.100	2175.134	13.800	2174.870	14.763	2174.793
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	972+600
To: Sta.	972+650
Total Length =	50.00 m
Surface Area =	1.17 m² / m
Total Area =	**58.50** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	972+600	2195.985	-0.00826	* 13.800	2196.083	14.630	2196.016	14.650	2196.196	14.800	2196.196	15.100	2196.196	13.800	2195.933	14.763	2195.855
2	972+625	2197.084	-0.02607	* 13.800	2197.392	14.630	2197.325	14.650	2197.505	14.800	2197.505	15.100	2197.505	13.800	2197.242	14.763	2197.165
3	972+650	2198.047	-0.04388	* 13.800	2198.565	14.630	2198.498	14.650	2198.678	14.800	2198.678	15.100	2198.678	13.800	2198.415	14.763	2198.338
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	972+925
To: Sta.	973+175
Total Length =	250.00 m
Surface Area =	1.17 m² / m
Total Area =	**292.50** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	972+925	2204.927	0.05030	* 13.800	2204.333	14.630	2204.267	14.650	2204.447	14.800	2204.447	15.100	2204.447	13.800	2204.183	14.763	2204.106
2	972+950	2205.821	0.05030	* 13.800	2205.227	14.630	2205.161	14.650	2205.341	14.800	2205.341	15.100	2205.341	13.800	2205.077	14.763	2205.000
3	972+975	2206.803	0.05030	* 13.800	2206.209	14.630	2206.143	14.650	2206.323	14.800	2206.323	15.100	2206.323	13.800	2206.059	14.763	2205.982
4	973+000	2207.873	0.05030	* 13.800	2207.279	14.630	2207.213	14.650	2207.393	14.800	2207.393	15.100	2207.393	13.800	2207.129	14.763	2207.052
5	973+025	2209.031	0.05030	* 13.800	2208.437	14.630	2208.371	14.650	2208.551	14.800	2208.551	15.100	2208.551	13.800	2208.287	14.763	2208.210
6	973+050	2210.269	0.05030	* 13.800	2209.675	14.630	2209.609	14.650	2209.789	14.800	2209.789	15.100	2209.789	13.800	2209.525	14.763	2209.448
7	973+075	2211.581	0.05030	* 13.800	2210.987	14.630	2210.921	14.650	2211.101	14.800	2211.101	15.100	2211.101	13.800	2210.837	14.763	2210.760
8	973+100	2213.033	0.05030	* 13.800	2212.439	14.630	2212.373	14.650	2212.553	14.800	2212.553	15.100	2212.553	13.800	2212.289	14.763	2212.212
9	973+125	2214.475	0.05030	13.800	2213.881	14.630	2213.815	14.650	2213.995	14.800	2213.995	15.100	2213.995	13.800	2213.731	14.763	2213.654
10	973+150	2215.797	0.04419	* 13.800	2215.276	14.630	2215.209	14.650	2215.389	14.800	2215.389	15.100	2215.389	13.800	2215.126	14.763	2215.049
11	973+175	2217.05	0.02696	* 13.800	2216.732	14.630	2216.665	14.650	2216.845	14.800	2216.845	15.100	2216.845	13.800	2216.582	14.763	2216.505
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	973+900
To: Sta.	973+925
Total Length =	25.00 m
Surface Area =	1.17 m² / m
Total Area =	**29.25** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	973+900	2241.332	-0.03669	* 13.800	2240.899	14.630	2240.833	14.650	2241.013	14.800	2241.013	15.100	2241.013	13.800	2240.749	14.763	2240.672
2	973+925	2243.685	-0.05004	* 13.800	2243.095	14.630	2243.028	14.650	2243.208	14.800	2243.208	15.100	2243.208	13.800	2242.945	14.763	2242.867
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	974+100
To: Sta.	974+175
Total Length =	75.00 m
Surface Area =	1.17 m² / m
Total Area =	**87.75** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	974+100	2259.715	-0.02229	* 13.800	2259.978	14.630	2259.912	14.650	2260.092	14.800	2260.092	15.100	2260.092	13.800	2259.828	14.763	2259.751
2	974+125	2261.196	0.01256	* 13.800	2261.048	14.630	2260.981	14.650	2261.161	14.800	2261.161	15.100	2261.161	13.800	2260.898	14.763	2260.821
3	974+150	2262.293	0.02828	* 13.800	2261.959	14.630	2261.893	14.650	2262.073	14.800	2262.073	15.100	2262.073	13.800	2261.809	14.763	2261.732
4	974+175	2263.005	0.04100	* 13.800	2262.521	14.630	2262.455	14.650	2262.635	14.800	2262.635	15.100	2262.635	13.800	2262.371	14.763	2262.294
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	974+150
To: Sta.	974+175
Total Length =	25.00 m
Surface Area =	1.17 m² / m
Total Area =	**29.25** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	974+150	2262.293	0.02828	* 13.800	2262.627	14.630	2262.560	14.650	2262.740	14.800	2262.740	15.100	2262.740	13.800	2262.477	14.763	2262.400
2	974+175	2263.005	0.04100	* 13.800	2263.489	14.630	2263.422	14.650	2263.602	14.800	2263.602	15.100	2263.602	13.800	2263.339	14.763	2263.262
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	974+375
To: Sta.	974+450
Total Length =	75.00 m
Surface Area =	1.17 m² / m
Total Area =	**87.75** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	974+375	2254.890	-0.03598	* 13.800	2254.465	14.630	2254.399	14.650	2254.579	14.800	2254.579	15.100	2254.579	13.800	2254.315	14.763	2254.238
2	974+400	2252.475	-0.04210	* 13.800	2251.978	14.630	2251.912	14.650	2252.092	14.800	2252.092	15.100	2252.092	13.800	2251.828	14.763	2251.751
3	974+425	2250.059	-0.04210	* 13.800	2249.562	14.630	2249.496	14.650	2249.676	14.800	2249.676	15.100	2249.676	13.800	2249.412	14.763	2249.335
4	974+450	2247.643	-0.04210	* 13.800	2247.146	14.630	2247.080	14.650	2247.260	14.800	2247.260	15.100	2247.260	13.800	2246.996	14.763	2246.919
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	974+875
To: Sta.	974+900
Total Length =	25.00 m
Surface Area =	1.17 m² / m
Total Area =	**29.25** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	974+875	2206.949	0.01500	* 13.800	2207.126	14.630	2207.060	14.650	2207.240	14.800	2207.240	15.100	2207.240	13.800	2206.976	14.763	2206.899
2	974+900	2204.656	0.01500	* 13.800	2204.833	14.630	2204.767	14.650	2204.947	14.800	2204.947	15.100	2204.947	13.800	2204.683	14.763	2204.606
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	974+950
To: Sta.	975+100
Total Length =	150.00 m
Surface Area =	1.17 m² / m
Total Area =	**175.50** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	974+950	2200.121	0.01500	* 13.800	2200.298	14.630	2200.232	14.650	2200.412	14.800	2200.412	15.100	2200.412	13.800	2200.148	14.763	2200.071
2	974+975	2197.879	0.01500	* 13.800	2198.056	14.630	2197.990	14.650	2198.170	14.800	2198.170	15.100	2198.170	13.800	2197.906	14.763	2197.829
3	975+000	2195.654	0.01500	* 13.800	2195.831	14.630	2195.765	14.650	2195.945	14.800	2195.945	15.100	2195.945	13.800	2195.681	14.763	2195.604
4	975+025	2193.448	0.01500	* 13.800	2193.625	14.630	2193.559	14.650	2193.739	14.800	2193.739	15.100	2193.739	13.800	2193.475	14.763	2193.398
5	975+050	2191.259	0.01500	* 13.800	2191.436	14.630	2191.370	14.650	2191.550	14.800	2191.550	15.100	2191.550	13.800	2191.286	14.763	2191.209
6	975+075	2189.08	0.01500	* 13.800	2189.257	14.630	2189.191	14.650	2189.371	14.800	2189.371	15.100	2189.371	13.800	2189.107	14.763	2189.030
7	975+100	2186.902	0.01500	* 13.800	2187.079	14.630	2187.013	14.650	2187.193	14.800	2187.193	15.100	2187.193	13.800	2186.929	14.763	2186.852
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	975+225
To: Sta.	975+275
Total Length =	50.00 m
Surface Area =	1.17 m² / m
Total Area =	**58.50** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	975+225	2176.009	0.00054	* 13.800	2176.015	14.630	2175.949	14.650	2176.129	14.800	2176.129	15.100	2176.129	13.800	2175.865	14.763	2175.788
2	975+250	2173.838	-0.01500	* 13.800	2173.661	14.630	2173.595	14.650	2173.775	14.800	2173.775	15.100	2173.775	13.800	2173.511	14.763	2173.434
3	975+275	2171.75	-0.01500	* 13.800	2171.573	14.630	2171.507	14.650	2171.687	14.800	2171.687	15.100	2171.687	13.800	2171.423	14.763	2171.346
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	975+925
To: Sta.	976+025
Total Length =	100.00 m
Surface Area =	1.17 m² / m
Total Area =	**117.00** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	975+925	2144.760	-0.03200	* 13.800	2145.138	14.630	2145.071	14.650	2145.251	14.800	2145.251	15.100	2145.251	13.800	2144.988	14.763	2144.911
2	975+950	2143.359	-0.03200	* 13.800	2143.737	14.630	2143.670	14.650	2143.850	14.800	2143.850	15.100	2143.850	13.800	2143.587	14.763	2143.510
3	975+975	2141.827	-0.03200	* 13.800	2142.205	14.630	2142.138	14.650	2142.318	14.800	2142.318	15.100	2142.318	13.800	2142.055	14.763	2141.978
4	976+000	2140.162	-0.03200	* 13.800	2140.540	14.630	2140.473	14.650	2140.653	14.800	2140.653	15.100	2140.653	13.800	2140.390	14.763	2140.313
5	976+025	2138.365	-0.03200	* 13.800	2138.743	14.630	2138.676	14.650	2138.856	14.800	2138.856	15.100	2138.856	13.800	2138.593	14.763	2138.516
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	976+650
To: Sta.	976+800
Total Length =	150.00 m
Surface Area =	1.17 m² / m
Total Area =	**175.50** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	976+650	2101.080	0.05050	* 13.800	2100.484	14.630	2100.418	14.650	2100.598	14.800	2100.598	15.100	2100.598	13.800	2100.334	14.763	2100.257
2	976+675	2099.815	0.05050	* 13.800	2099.219	14.630	2099.153	14.650	2099.333	14.800	2099.333	15.100	2099.333	13.800	2099.069	14.763	2098.992
3	976+700	2098.417	0.05050	* 13.800	2097.821	14.630	2097.755	14.650	2097.935	14.800	2097.935	15.100	2097.935	13.800	2097.671	14.763	2097.594
4	976+725	2096.892	0.05050	* 13.800	2096.296	14.630	2096.230	14.650	2096.410	14.800	2096.410	15.100	2096.410	13.800	2096.146	14.763	2096.069
5	976+750	2095.334	0.05050	* 13.800	2094.738	14.630	2094.672	14.650	2094.852	14.800	2094.852	15.100	2094.852	13.800	2094.588	14.763	2094.511
6	976+775	2093.776	0.05050	* 13.800	2093.180	14.630	2093.114	14.650	2093.294	14.800	2093.294	15.100	2093.294	13.800	2093.030	14.763	2092.953
7	976+800	2092.218	0.05050	* 13.800	2091.622	14.630	2091.556	14.650	2091.736	14.800	2091.736	15.100	2091.736	13.800	2091.472	14.763	2091.395
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CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH RIGHT SIDE

From: Sta.	977+250
To: Sta.	977+525
Total Length =	275.00 m
Surface Area =	1.17 m² / m
Total Area =	**321.75** m²

1	2	3	4	5	6=3+4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	977+250	2078.606	0.01839	* 13.800	2078.823	14.630	2078.757	14.650	2078.937	14.800	2078.937	15.100	2078.937	13.800	2078.673	14.763	2078.596
2	977+275	2077.579	-0.00312	* 13.800	2077.542	14.630	2077.476	14.650	2077.656	14.800	2077.656	15.100	2077.656	13.800	2077.392	14.763	2077.315
3	977+300	2076.395	-0.02423	* 13.800	2076.109	14.630	2076.043	14.650	2076.223	14.800	2076.223	15.100	2076.223	13.800	2075.959	14.763	2075.882
4	977+325	2075.054	-0.04258	* 13.800	2074.552	14.630	2074.485	14.650	2074.665	14.800	2074.665	15.100	2074.665	13.800	2074.402	14.763	2074.325
5	977+350	2073.556	-0.05360	* 13.800	2072.924	14.630	2072.857	14.650	2073.037	14.800	2073.037	15.100	2073.037	13.800	2072.774	14.763	2072.696
6	977+375	2071.901	-0.05360	* 13.800	2071.269	14.630	2071.202	14.650	2071.382	14.800	2071.382	15.100	2071.382	13.800	2071.119	14.763	2071.041
7	977+400	2070.089	-0.05360	* 13.800	2069.457	14.630	2069.390	14.650	2069.570	14.800	2069.570	15.100	2069.570	13.800	2069.307	14.763	2069.229
8	977+425	2068.128	-0.05360	* 13.800	2067.496	14.630	2067.429	14.650	2067.609	14.800	2067.609	15.100	2067.609	13.800	2067.346	14.763	2067.268
9	977+450	2066.133	-0.05360	* 13.800	2065.501	14.630	2065.434	14.650	2065.614	14.800	2065.614	15.100	2065.614	13.800	2065.351	14.763	2065.273
10	977+475	2064.138	-0.05360	* 13.800	2063.506	14.630	2063.439	14.650	2063.619	14.800	2063.619	15.100	2063.619	13.800	2063.356	14.763	2063.278
11	977+500	2062.143	-0.05360	* 13.800	2061.511	14.630	2061.444	14.650	2061.624	14.800	2061.624	15.100	2061.624	13.800	2061.361	14.763	2061.283
12	977+525	2060.148	-0.04643	* 13.800	2059.600	14.630	2059.534	14.650	2059.714	14.800	2059.714	15.100	2059.714	13.800	2059.450	14.763	2059.373

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	978+075
To: Sta.	978+125
Total Length =	50.00 m
Surface Area =	1.17 m² / m
Total Area =	**58.50** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	978+075	2069.163	0.01362	* 13.800	2069.002	14.630	2068.936	14.650	2069.116	14.800	2069.116	15.100	2069.116	13.800	2068.852	14.763	2068.775
2	978+100	2070.817	-0.01500	* 13.800	2070.994	14.630	2070.928	14.650	2071.108	14.800	2071.108	15.100	2071.108	13.800	2070.844	14.763	2070.767
3	978+125	2072.471	-0.02751	* 13.800	2072.796	14.630	2072.729	14.650	2072.909	14.800	2072.909	15.100	2072.909	13.800	2072.646	14.763	2072.569
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD
(Section 3)

LOCATIONS OF CONCRETE LINE DITCH LEFT SIDE

From: Sta.	978+250
To: Sta.	978+400
Total Length =	150.00 m
Surface Area =	1.17 m² / m
Total Area =	**175.50** m²

1	2	3	4	5	6=3-4*11.8	7=5+0.83	8=6-.83*.08	9=7+0.02	10=8+0.18	11=9+.15	12=10	13=11+0.3	14=10	15=5	16=6-0.15	17=15+.963	18=16-.963*.08
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	978+250	2080.739	-0.03830	* 13.800	2081.191	14.630	2081.125	14.650	2081.305	14.800	2081.305	15.100	2081.305	13.800	2081.041	14.763	2080.964
2	978+275	2082.393	-0.00139	* 13.800	2082.409	14.630	2082.343	14.650	2082.523	14.800	2082.523	15.100	2082.523	13.800	2082.259	14.763	2082.182
3	978+300	2084.047	0.03552	* 13.800	2083.628	14.630	2083.562	14.650	2083.742	14.800	2083.742	15.100	2083.742	13.800	2083.478	14.763	2083.401
4	978+325	2085.701	0.06000	* 13.800	2084.993	14.630	2084.927	14.650	2085.107	14.800	2085.107	15.100	2085.107	13.800	2084.843	14.763	2084.766
5	978+350	2087.355	0.06000	* 13.800	2086.647	14.630	2086.581	14.650	2086.761	14.800	2086.761	15.100	2086.761	13.800	2086.497	14.763	2086.420
6	978+375	2088.9	0.06000	* 13.800	2088.192	14.630	2088.126	14.650	2088.306	14.800	2088.306	15.100	2088.306	13.800	2088.042	14.763	2087.965
7	978+400	2090.298	0.06000	* 13.800	2089.590	14.630	2089.524	14.650	2089.704	14.800	2089.704	15.100	2089.704	13.800	2089.440	14.763	2089.363
8																	
9																	
10																	
11																	
12																	

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

300	275
275	150
25	25
175	125
100	175
475	1100
25	375
500	100
125	225
625	75
125	125
200	150
200	50
175	250
300	25
75	50
350	25
75	75
575	25
75	150
200	50
275	100
175	150
300	275
150	50
125	150
400	**4325**
225	
150	
350	
7125	

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
ITAL CONSULT	**MINISTRY OF TRANSPORT**	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : **6060202 - GROUTED STONE RIP-RAP PROT'N** Drwg. No. _____

SHOMROCK AREA

FROM: STA. 46+500.000

TO: STA. 47+500.000

SUMMARY

No.	STATION		SIDE	DISTANCE	SECT'NAL AREA	TOTAL VOLUME
	FROM	TO		(m.)	(m²)	(m³)
1	46+500.000	47+500.000	Right	1000.000	3.222	3222.000
2	46+600.000	47+500.000	Left	900.000	3.332	2998.800
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
					Grand Total =	**6,220.800**

Contractor :		Suprv'g. Consultant :
M. A. AL SWAILEM CO.	***DOUBLING TAIF AL BAHA ABHA ROAD***	***ITAL CONSULT***

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.210	
A2 =	1.632	
A3 =	0.720	
A4 =	0.660	
At =	**3.222**	m²
= 3.305 m²		

a1 = 1.707	a9 = 1.896
a2 = 1.765	a10=1.823
a3 = 1.855	a11=1.736
a4 = 1.896	a12=1.707
a5 = 1.896	a13=1.707
a6 = 1.896	a14=1.707
a7 = 1.896	a15=1.707
a8 = 1.896	
Aave1-15	1.806

LOCATIONS OF GROUTED RIP-RAP

From: Sta.	46+500
To: Sta.	47+500
Total Length =	1000.00 m
Sec'l Area =	3.222 m²
Total Volume =	**3222.37** m³

RIGHT SIDE

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+0.5*4	-(0.63/.25+4	0=8-(9-7)*.2	11=9+1.459	12=10	13=11+0.666	14=12+1.0	15=13+0.541	16=14	17=15-0.666	18=12
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	46+500	1861.161	-0.01500	* 12.160	1860.984	12.660	1860.977	16.341	1860.056	17.800	1860.056	18.466	1861.056	19.007	1861.056	18.341	1860.056
2	46+525	1860.757	-0.02539	* 12.160	1860.457	12.660	1860.445	16.465	1859.494	17.924	1859.494	18.590	1860.494	19.131	1860.494	18.465	1859.494
3	46+550	1860.305	-0.04001	* 12.160	1859.833	12.660	1859.813	16.660	1858.813	18.119	1858.813	18.785	1859.813	19.326	1859.813	18.660	1858.813
4	46+575	1859.806	-0.04600	* 12.160	1859.263	12.660	1859.240	16.748	1858.218	18.207	1858.218	18.873	1859.218	19.414	1859.218	18.748	1858.218
5	46+600	1859.260	-0.04600	* 12.160	1858.717	12.660	1858.694	16.748	1857.672	18.207	1857.672	18.873	1858.672	19.414	1858.672	18.748	1857.672
6	46+625	1858.667	-0.04600	* 12.160	1858.124	12.660	1858.101	16.748	1857.079	18.207	1857.079	18.873	1858.079	19.414	1858.079	18.748	1857.079
7	46+650	1858.027	-0.04600	* 12.160	1857.484	12.660	1857.461	16.748	1856.439	18.207	1856.439	18.873	1857.439	19.414	1857.439	18.748	1856.439
8	46+675	1857.340	-0.04600	* 12.160	1856.797	12.660	1856.774	16.748	1855.752	18.207	1855.752	18.873	1856.752	19.414	1856.752	18.748	1855.752
9	46+700	1856.605	-0.04600	* 12.160	1856.062	12.660	1856.039	16.748	1855.017	18.207	1855.017	18.873	1856.017	19.414	1856.017	18.748	1855.017
10	46+725	1855.823	-0.03498	* 12.160	1855.410	12.660	1855.393	16.590	1854.410	18.049	1854.410	18.715	1855.410	19.256	1855.410	18.590	1854.410
11	46+750	1854.995	-0.02035	* 12.160	1854.755	12.660	1854.745	16.403	1853.809	17.862	1853.809	18.528	1854.809	19.069	1854.809	18.403	1853.809
12	46+775	1854.119	-0.01500	* 12.160	1853.942	12.660	1853.935	16.341	1853.014	17.800	1853.014	18.466	1854.014	19.007	1854.014	18.341	1853.014
13	46+800	1853.195	-0.01500	* 12.160	1853.018	12.660	1853.011	16.341	1852.090	17.800	1852.090	18.466	1853.090	19.007	1853.090	18.341	1852.090
14	46+825	1852.225	-0.01500	* 12.160	1852.048	12.660	1852.041	16.341	1851.120	17.800	1851.120	18.466	1852.120	19.007	1852.120	18.341	1851.120
15	46+850	1851.208	-0.01500	* 12.160	1851.031	12.660	1851.024	16.341	1850.103	17.800	1850.103	18.466	1851.103	19.007	1851.103	18.341	1850.103

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.210	
A2 =	1.632	
A3 =	0.720	
A4 =	0.660	
At =	**3.222**	m²
= 3.305 m²		

a16=1.707	a24=1.576
a17=1.707	a25=1.515
a18=1.707	a26=1.463
a19=1.707	a27=1.451
a20=1.707	a28=1.451
a21=1.707	a29=1.451
a22=1.707	a30=1.451
a23=1.661	
Aave16-30	1.598

LOCATIONS OF GROUTED RIP-RAP

From: Sta.	46+500
To: Sta.	47+500
Total Length =	1000.00 m
Sec'l Area =	3.222 m²
Total Volume =	**3222.37** m³

RIGHT SIDE

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+0.5*4	-(0.63/.25+4	0=8-(9-7)*.2	11=9+1.459	12=10	13=11+0.666	14=12+1.0	15=13+0.541	16=14	17=15-0.666	18=12
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
16	46+875	1850.143	-0.01500	* 12.160	1849.966	12.660	1849.959	16.341	1849.038	17.800	1849.038	18.466	1850.038	19.007	1850.038	18.341	1849.038
17	46+900	1849.032	-0.01500	* 12.160	1848.855	12.660	1848.848	16.341	1847.927	17.800	1847.927	18.466	1848.927	19.007	1848.927	18.341	1847.927
18	46+925	1847.873	-0.01500	* 12.160	1847.696	12.660	1847.689	16.341	1846.768	17.800	1846.768	18.466	1847.768	19.007	1847.768	18.341	1846.768
19	46+950	1846.667	-0.01500	* 12.160	1846.490	12.660	1846.483	16.341	1845.562	17.800	1845.562	18.466	1846.562	19.007	1846.562	18.341	1845.562
20	46+975	1845.414	-0.01500	* 12.160	1845.237	12.660	1845.230	16.341	1844.309	17.800	1844.309	18.466	1845.309	19.007	1845.309	18.341	1844.309
21	47+000	1844.114	-0.01500	* 12.160	1843.937	12.660	1843.930	16.341	1843.009	17.800	1843.009	18.466	1844.009	19.007	1844.009	18.341	1843.009
22	47+025	1842.767	-0.01500	* 12.160	1842.590	12.660	1842.583	16.341	1841.662	17.800	1841.662	18.466	1842.662	19.007	1842.662	18.341	1841.662
23	47+050	1841.372	-0.00596	* 12.160	1841.302	12.660	1841.299	16.242	1840.403	17.701	1840.403	18.367	1841.403	18.908	1841.403	18.242	1840.403
24	47+075	1839.930	0.01279	* 12.160	1840.081	12.660	1840.087	16.057	1839.238	17.516	1839.238	18.182	1840.238	18.723	1840.238	18.057	1839.238
25	47+100	1838.442	0.02790	* 12.160	1838.771	12.660	1838.785	15.927	1837.968	17.386	1837.968	18.052	1838.968	18.593	1838.968	17.927	1837.968
26	47+125	1836.906	0.04252	* 12.160	1837.408	12.660	1837.429	15.814	1836.641	17.273	1836.641	17.939	1837.641	18.480	1837.641	17.814	1836.641
27	47+150	1835.323	0.04600	* 12.160	1835.866	12.660	1835.889	15.788	1835.107	17.247	1835.107	17.913	1836.107	18.454	1836.107	17.788	1835.107
28	47+175	1833.693	0.04600	* 12.160	1834.236	12.660	1834.259	15.788	1833.477	17.247	1833.477	17.913	1834.477	18.454	1834.477	17.788	1833.477
29	47+200	1832.016	0.04600	* 12.160	1832.559	12.660	1832.582	15.788	1831.800	17.247	1831.800	17.913	1832.800	18.454	1832.800	17.788	1831.800
30	47+225	1830.292	0.04600	* 12.160	1830.835	12.660	1830.858	15.788	1830.076	17.247	1830.076	17.913	1831.076	18.454	1831.076	17.788	1830.076

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.210	
A2 =	1.632	
A3 =	0.720	
A4 =	0.660	
At =	**3.222**	m²
= 3.305 m²		

a31=1.451	a39=1.518
a32=1.451	a40=1.580
a33=1.451	a41=1.698
a34=1.451	
a35=1.451	
a36=1.451	
a37=1.451	
a38=1.465	
Aave31-41	1.493

LOCATIONS OF GROUTED RIP-RAP — RIGHT SIDE

From: Sta.	46+500
To: Sta.	47+500
Total Length =	1000.00 m
Sec'l Area =	3.222 m²
Total Volume =	**3222.37** m³

1	2	3	4	5	6=3+4*11.8	7=5+0.50	8=6+0.5*4	-(0.63/.25+4	0=8-(9-7)*.2	11=9+1.459	12=10	13=11+0.666	14=12+1.0	15=13+0.541	16=14	17=15-0.666	18=12
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
31	47+250	1828.520	0.04600	* 12.160	1829.063	12.660	1829.086	15.788	1828.304	17.247	1828.304	17.913	1829.304	18.454	1829.304	17.788	1828.304
32	47+275	1826.702	0.04600	* 12.160	1827.245	12.660	1827.268	15.788	1826.486	17.247	1826.486	17.913	1827.486	18.454	1827.486	17.788	1826.486
33	47+300	1824.836	0.04600	* 12.160	1825.379	12.660	1825.402	15.788	1824.620	17.247	1824.620	17.913	1825.620	18.454	1825.620	17.788	1824.620
34	47+325	1822.923	0.04600	* 12.160	1823.466	12.660	1823.489	15.788	1822.707	17.247	1822.707	17.913	1823.707	18.454	1823.707	17.788	1822.707
35	47+350	1820.963	0.04600	* 12.160	1821.506	12.660	1821.529	15.788	1820.747	17.247	1820.747	17.913	1821.747	18.454	1821.747	17.788	1820.747
36	47+375	1818.956	0.04600	* 12.160	1819.499	12.660	1819.522	15.788	1818.740	17.247	1818.740	17.913	1819.740	18.454	1819.740	17.788	1818.740
37	47+400	1816.901	0.04600	* 12.160	1817.444	12.660	1817.467	15.788	1816.685	17.247	1816.685	17.913	1817.685	18.454	1817.685	17.788	1816.685
38	47+425	1814.800	0.04175	* 12.160	1815.293	12.660	1815.314	15.819	1814.524	17.278	1814.524	17.944	1815.524	18.485	1815.524	17.819	1814.524
39	47+450	1812.675	0.02713	* 12.160	1812.995	12.660	1813.009	15.933	1812.190	17.392	1812.190	18.058	1813.190	18.599	1813.190	17.933	1812.190
40	47+475	1810.550	0.01180	* 12.160	1810.689	12.660	1810.695	16.066	1809.844	17.525	1809.844	18.191	1810.844	18.732	1810.844	18.066	1809.844
41	47+500	1808.425	-0.01331	* 12.160	1808.268	12.660	1808.261	16.322	1807.346	17.781	1807.346	18.447	1808.346	18.988	1808.346	18.322	1807.346

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.210	
A2 =	1.742	
A3 =	0.720	
A4 =	0.660	
At =	**3.332**	m²
= 3.305 m²		

a1 = 1.451	a9 = 1.707
a2 = 1.451	a10=1.707
a3 = 1.451	a11=1.707
a4 = 1.451	a12=1.707
a5 = 1.451	a13=1.707
a6 = 1.489	a14=1.707
a7 = 1.545	a15=1.707
a8 = 1.618	
Aave1-15	1.591

LOCATIONS OF GROUTED RIP-RAP

From: Sta.	46+600
To: Sta.	47+500
Total Length =	900.00 m
Sec'l Area =	3.332 m²
Total Volume =	**2998.77** m³

LEFT SIDE

1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-0.5*4	+(0.63/.25-4)	0=8-(9-7)*.2	11=9+1.459	12=10	13=11+0.666	14=12+1.0	15=13+0.54	16=14	17=15-0.666	18=12
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
1	46+600	1859.260	-0.04600	* 12.160	1859.803	12.660	1859.826	15.788	1859.044	17.247	1859.044	17.913	1860.044	18.454	1860.044	17.788	1859.044
2	46+625	1858.667	-0.04600	* 12.160	1859.210	12.660	1859.233	15.788	1858.451	17.247	1858.451	17.913	1859.451	18.454	1859.451	17.788	1858.451
3	46+650	1858.027	-0.04600	* 12.160	1858.570	12.660	1858.593	15.788	1857.811	17.247	1857.811	17.913	1858.811	18.454	1858.811	17.788	1857.811
4	46+675	1857.340	-0.04600	* 12.160	1857.883	12.660	1857.906	15.788	1857.124	17.247	1857.124	17.913	1858.124	18.454	1858.124	17.788	1857.124
5	46+700	1856.605	-0.04600	* 12.160	1857.148	12.660	1857.171	15.788	1856.389	17.247	1856.389	17.913	1857.389	18.454	1857.389	17.788	1856.389
6	46+725	1855.823	-0.03498	* 12.160	1856.236	12.660	1856.253	15.871	1855.451	17.330	1855.451	17.996	1856.451	18.537	1856.451	17.871	1855.451
7	46+750	1854.995	-0.02035	* 12.160	1855.235	12.660	1855.245	15.990	1854.413	17.449	1854.413	18.115	1855.413	18.656	1855.413	17.990	1854.413
8	46+775	1854.119	-0.00312	* 12.160	1854.156	12.660	1854.157	16.149	1853.285	17.608	1853.285	18.274	1854.285	18.815	1854.285	18.149	1853.285
9	46+800	1853.195	0.01500	* 12.160	1853.018	12.660	1853.011	16.341	1852.090	17.800	1852.090	18.466	1853.090	19.007	1853.090	18.341	1852.090
10	46+825	1852.225	0.01500	* 12.160	1852.048	12.660	1852.041	16.341	1851.120	17.800	1851.120	18.466	1852.120	19.007	1852.120	18.341	1851.120
11	46+850	1851.208	0.01500	* 12.160	1851.031	12.660	1851.024	16.341	1850.103	17.800	1850.103	18.466	1851.103	19.007	1851.103	18.341	1850.103
12	46+875	1850.143	0.01500	* 12.160	1849.966	12.660	1849.959	16.341	1849.038	17.800	1849.038	18.466	1850.038	19.007	1850.038	18.341	1849.038
13	46+900	1849.032	0.01500	* 12.160	1848.855	12.660	1848.848	16.341	1847.927	17.800	1847.927	18.466	1848.927	19.007	1848.927	18.341	1847.927
14	46+925	1847.873	0.01500	* 12.160	1847.696	12.660	1847.689	16.341	1846.768	17.800	1846.768	18.466	1847.768	19.007	1847.768	18.341	1846.768
15	46+950	1846.667	0.01500	* 12.160	1846.490	12.660	1846.483	16.341	1845.562	17.800	1845.562	18.466	1846.562	19.007	1846.562	18.341	1845.562

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.210	
A2 =	1.742	
A3 =	0.720	
A4 =	0.660	
At =	**3.332**	m²
= 3.305 m²		

a16=1.707	a24=1.896
a17=1.707	a25=1.896
a18=1.707	a26=1.896
a19=1.707	a27=1.896
a20=1.707	a28=1.896
a21=1.780	a29=1.896
a22=1.872	a30=1.896
a23=1.896	
Aave16-30	1.824

LOCATIONS OF GROUTED RIP-RAP — LEFT SIDE

From: Sta.	46+600
To: Sta.	47+500
Total Length =	900.00 m
Sec'l Area =	3.332 m²
Total Volume =	**2998.77** m³

1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-0.5*4	-(0.63/.25-4)	0=8-(9-7)*.2	11=9+1.459	12=10	13=11+0.666	14=12+1.0	15=13+0.541	16=14	17=15-0.666	18=12
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
16	46+975	1845.414	0.01500	* 12.160	1845.237	12.660	1845.230	16.341	1844.309	17.800	1844.309	18.466	1845.309	19.007	1845.309	18.341	1844.309
17	47+000	1844.114	0.01500	* 12.160	1843.937	12.660	1843.930	16.341	1843.009	17.800	1843.009	18.466	1844.009	19.007	1844.009	18.341	1843.009
18	47+025	1842.767	0.01500	* 12.160	1842.590	12.660	1842.583	16.341	1841.662	17.800	1841.662	18.466	1842.662	19.007	1842.662	18.341	1841.662
19	47+050	1841.372	0.01500	* 12.160	1841.195	12.660	1841.188	16.341	1840.267	17.800	1840.267	18.466	1841.267	19.007	1841.267	18.341	1840.267
20	47+075	1839.930	0.01500	* 12.160	1839.753	12.660	1839.746	16.341	1838.825	17.800	1838.825	18.466	1839.825	19.007	1839.825	18.341	1838.825
21	47+100	1838.442	0.02790	* 12.160	1838.113	12.660	1838.099	16.497	1837.140	17.956	1837.140	18.622	1838.140	19.163	1838.140	18.497	1837.140
22	47+125	1836.906	0.04252	* 12.160	1836.404	12.660	1836.383	16.696	1835.374	18.155	1835.374	18.821	1836.374	19.362	1836.374	18.696	1835.374
23	47+150	1835.323	0.04600	* 12.160	1834.780	12.660	1834.757	16.748	1833.735	18.207	1833.735	18.873	1834.735	19.414	1834.735	18.748	1833.735
24	47+175	1833.693	0.04600	* 12.160	1833.150	12.660	1833.127	16.748	1832.105	18.207	1832.105	18.873	1833.105	19.414	1833.105	18.748	1832.105
25	47+200	1832.016	0.04600	* 12.160	1831.473	12.660	1831.450	16.748	1830.428	18.207	1830.428	18.873	1831.428	19.414	1831.428	18.748	1830.428
26	47+225	1830.292	0.04600	* 12.160	1829.749	12.660	1829.726	16.748	1828.704	18.207	1828.704	18.873	1829.704	19.414	1829.704	18.748	1828.704
27	47+250	1828.520	0.04600	* 12.160	1827.977	12.660	1827.954	16.748	1826.932	18.207	1826.932	18.873	1827.932	19.414	1827.932	18.748	1826.932
28	47+275	1826.702	0.04600	* 12.160	1826.159	12.660	1826.136	16.748	1825.114	18.207	1825.114	18.873	1826.114	19.414	1826.114	18.748	1825.114
29	47+300	1824.836	0.04600	* 12.160	1824.293	12.660	1824.270	16.748	1823.248	18.207	1823.248	18.873	1824.248	19.414	1824.248	18.748	1823.248
30	47+325	1822.923	0.04600	* 12.160	1822.380	12.660	1822.357	16.748	1821.335	18.207	1821.335	18.873	1822.335	19.414	1822.335	18.748	1821.335

CONTRACTOR:

M. A. AL SWAILEM CO.

CONSULTANT:

ITAL CONSULT

Project: DOUBLING OF TAIF-AL BAHA-ABHA ROAD (Section 3)

Cross Sectional Area

A1 =	0.210	
A2 =	1.742	
A3 =	0.720	
A4 =	0.660	
At =	**3.332**	m²
= 3.305 m²		

a31=1.896
a32=1.896
a33=1.896
a34=1.867
a35=1.775
a36=1.707
a37=1.641

Aave31-37 1.811

LOCATIONS OF GROUTED RIP-RAP LEFT SIDE

From: Sta.	46+600
To: Sta.	47+500
Total Length =	900.00 m
Sec'l Area =	3.332 m²
Total Volume =	**2998.77** m³

1	2	3	4	5	6=3-4*11.8	7=5+0.50	8=6-0.5*4	+(0.63/.25-4)	0=8-(9-7)*.2	11=9+1.459	12=10	13=11+0.666	14=12+1.0	15=13+0.541	16=14	17=15-0.666	18=12
NO.	STATION	PGL	S.E.	a		b		c		d		e		f		g	
				Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n	Offset	Elev'n
31	47+350	1820.963	0.04600	* 12.160	1820.420	12.660	1820.397	16.748	1819.375	18.207	1819.375	18.873	1820.375	19.414	1820.375	18.748	1819.375
32	47+375	1818.956	0.04600	* 12.160	1818.413	12.660	1818.390	16.748	1817.368	18.207	1817.368	18.873	1818.368	19.414	1818.368	18.748	1817.368
33	47+400	1816.901	0.04600	* 12.160	1816.358	12.660	1816.335	16.748	1815.313	18.207	1815.313	18.873	1816.313	19.414	1816.313	18.748	1815.313
34	47+425	1814.800	0.04175	* 12.160	1814.307	12.660	1814.286	16.685	1813.280	18.144	1813.280	18.810	1814.280	19.351	1814.280	18.685	1813.280
35	47+450	1812.675	0.02713	* 12.160	1812.355	12.660	1812.341	16.487	1811.385	17.946	1811.385	18.612	1812.385	19.153	1812.385	18.487	1811.385
36	47+475	1810.550	0.01500	* 12.160	1810.373	12.660	1810.366	16.341	1809.445	17.800	1809.445	18.466	1810.445	19.007	1810.445	18.341	1809.445
37	47+500	1808.425	0.00169	* 12.160	1808.405	12.660	1808.404	16.197	1807.520	17.656	1807.520	18.322	1808.520	18.863	1808.520	18.197	1807.520

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

Project : **DOUBLING TAIF AL BAHA-ABHA ROAD** Page: __1_ of _1_

Item : **6060202 - GROUTED STONE RIP-RAP PROT'N** Drwg. No. _____

FROM: STA. 44+875.000

TO: STA. 60+000.000

SUMMARY

No.	STATION		DISTANCE	TOTAL VOLUME	REMARKS
	FROM	TO	m	m³	
1	44+875.000	50+165.247	5290.247	1073.774	
2	46+475.000	47+525.000	1050.000	87.626	@ TRANSITION
3	46+500.000	47+500.000	1000.000	6220.800	@ SHOMROCK
4	50+750.000	59+075.000	8325.000	349.450	
5	50+725.000	59+100.000	8375.000	568.370	@ TRANSITION
			GRAND TOTAL =	**8,300.020**	

Contractor : ***M. A. AL SWAILEM CO.***	***DOUBLING TAIF AL BAHA ABHA ROAD***	Suprv'g. Consultant : ***ITAL CONSULT***

Suprv'g. Consultant : SAUDCONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : **Qassim - Hail Road (I/C 3)** Page: __1_ of _1_

Item : ***60605*** **R.C. SLOPE PROTECTION** Drwg. No. _____

60605 R.C. SLOPE PROTECTION

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REMARKS
60605	R.C. SLOPE PROTECTION	M²	3,534.057	
	Grand total	M²	3,534.057	

Contractor : M. A. AL SWAILEM CO.	Qassim - Hail Road (I/C 3)	Suprv'g. Consultant : SAUDCONSULT
Quantity Surveyor / Proj. Manager		Quantity Surveyor / Res. Engineer

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
SAUDCONSULT	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **Qassim - Hail Road (I/C 3)** Page: __1_ of _1_

Item : ***60605*** **R.C. SLOPE PROTECTION** Drwg. No. _____

60605 R.C. SLOPE PROTECTION

SUMMARY

Ser. No.	LOCATION	UNIT	TOTAL	REMARKS
1	R.C. PIPE CULVERT	M²	24.049	
2	BRIDGE @ ABUTMENT 1 & 2	M²	3,510.008	
	Grand total	M²	3,534.057	

Contractor :		Qassim - Hail Road (I/C 3)	Suprv'g. Consultant :	
M. A. AL SWAILEM CO.			**SAUDCONSULT**	
Quantity Surveyor	Proj. Manager		Quantity Surveyor	Res. Engineer

Suprv'g Consultant: *SAUDCONSULT*	KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor: *M. A. AL SWAILEM CO.*

COMPUTATION OF FINAL QUANTITIES
الكميات النهائية

Project:	Qassim - Hail Road (I/C 3)	Page of
Item Description:	*R.C. SLOPE PROTECTION*	Drwg. No.
Item No.:	60605	Date:

60605 R.C. SLOPE PROTECTION

Serial No.	STATION	LOCATION	No. of Rows	AREA OF CONCRETE (m²)	REF. PAGE
1	1+150	Main Road	1	24.049	2 of 11
2					
3					
4					
5					
6					
7					
8					
9					
10					
		TOTAL =		24.049	

Note:

Please refer to Approved AS BUILT Drawings

Contractor: *M. A. AL SWAILEM CO.*	Qassim - Hail Road (I/C 3)	Consultant: *SAUDCONSULT*
Q.S. / Proj. Manager		Q.S. / Res. Engineer

Suprv'g. Consultant : SAUDCONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : Qassim - Hail Road (I/C 3) — Page: ___ of __

Item Description : R.C. SLOPE PROTECTION — Drwg. No. _____

Item No. : 60605

60605 R.C. SLOPE PROTECTION

Structure: RCPC: 1 - 800mm. Ø
MAIN ROAD (D/S & U/S)
STA. 1+150 (Normal skew)

Sectional Details

ELEVATION

Area of Ellipse = ¶ x ab
where:
a-ds = B/2 = 2.083
a-us = B/2 = 2.001
b = O.D./2 = 0.495

Depth:

Slop	Slope =	4 : 1	Ø= 14.036	U/S=	1.00	m.	A=	1.000	m.			
	I.D =	0.80	m.	D/S=	2.00	m.	Bds =	4.165	m.			
	T =	0.095	m.	T1=	0.15	m.	Bus =	4.002	m.	Lds =	5.165	m.
	O.D	0.99	m.	T2=	0.25	m.	C=	2.990	m.	Lus =	5.002	m.

1	2	3	4	5	6	7	8	9 = 2*4*5
Member	Slope Length L	Width, C	T1 or T2	No. of Panel	Value of Pi	R = a	R = b	TOTAL AREA (M²)
Concrete Slope Protection:								
1. SLAB								
D/S	5.165	2.990		1				15.443
U/S	5.002	2.990		1				14.956
2. Less: opening								
		no. of pipe						
D/S	ELLIPSE	1		1	-3.1416	2.083	0.495	-3.238
U/S	ELLIPSE	1		1	-3.1416	2.001	0.495	-3.112
						TOTAL AREA =		**24.049**

Contractor : M. A. AL SWAILEM CO.	Qassim - Hail Road (I/C 3)	Suprv'g. Consultant : SAUDCONSULT
Quantity Surveyor — Proj. Manager		Quantity Surveyor — Res. Engineer

QASSIM - HAIL ROAD

Interchange No.3

COMPUTATION OF FINAL QUANTITIES

IN

REIF. CONC. SLOPE PROTECTION

Item No. 60605

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
SAUD CONSULT

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES

الكميات النهائية

Project : DOUBLING TAIF AL BAHA - ABHA ROAD — Page: __1_ of _1_

Item : 6-16-1 R.O.W. MONUMENT — Drwg. No. _____

6-16-1 R.O.W. MONUMENT

SUMMARY

Item No.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
6-16-1	R.O.W. MONUMENT	Pcs.	47	page 1 of 3
	Grand total	Pcs.	47	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

FINAL QUANTITIES

الكميات النهائية

Project : DOUBLING TAIF AL BAHA - ABHA ROAD — Page: __1_ of _1_

Item : 6-16-2A BRASS PLATE — Drwg. No. _____

6-16-2A BRASS PLATE

SUMMARY

Item No.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
6-16-2A	BRASS PLATE	Pcs.	11	page 1 of 3
	Grand total	Pcs.	11	

Suprv'g. Consultant : *ITAL CONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL QUANTITIES
الكميات النهائية

Project : DOUBLING TAIF AL BAHA - ABHA ROAD — Page: __1_ of _3_

Item : 6-16-1 & 6-16-2A R.O.W. MONUMENT & BRASS PLATE — Drwg. No. _____

SUMMARY

ITEM NO.	DESCRIPTION	UNIT	SUB-TOTAL 1 (Left & Right)	SUB-TOTAL 2 (Left & Right)	TOTAL
6-16-1	R.O.W. MONUMENT	PCS.	22	25	47
6-16-2A	BRASS PLATE	PCS.	5	6	11

Suprv'g. Consultant : *ITAL CONSULT*	*DOUBLING TAIF AL BAHA - ABHA ROAD*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor — Res. Engineer		Quantity Surveyor — Proj. Manager

Suprv'g. Consultant : ***ITAL CONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF TRANSPORT** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : **DOUBLING TAIF AL BAHA - ABHA ROAD** Page: ___2___ of ___3___

Item : ***6-16-1 & 6-16-2A*** **R.O.W. MONUMENT & BRASS PLATE** Drwg. No. _____

LEFT SIDE			STATION	RIGHT SIDE		
Notes	Brass Plate	R.O.W. Monument		R.O.W. Monument	Brass Plate	Notes
			0+075.144	▨		TS-SERV. RD. "J"
			0+105.144	▨		SC-SERV. RD. "J"
			0+531.287	▨		CS-SERV. RD. "J"
			0+561.287	▨		ST-SERV. RD. "J"
			0+724.856	▨		TS-SERV. RD. "J"
			0+754.856	▨		SC-SERV. RD. "J"
			1+097.079	▨		CS-SERV. RD. "J"
			1+127.079	▨		ST-SERV. RD. "J"
			1+000.000	▨	●	ML-ROW=100
ML-ROW=100		▨	1+500.000	▨		ML-ROW=100
ML-ROW=100	●	▨	2+000.000	▨	●	ML-ROW=100
ML-ROW=100		▨	2+500.000	▨		ML-ROW=100
CT-SER. RD.D		▨	2+900.000	▨		TC-SERV. RD. :A"
ML-ROW VAR.	●	▨	3+000.000	▨	●	ML-ROW VAR.
			3+284.730	▨		CT-SER. RD. "A"
			0+593.625	▨		TC-SER. RD. "A"
			0+627.064	▨		PCC-SER. RD. "A"
	2	5	**SUB-TOTAL 1**	17	3	

Suprv'g. Consultant : ***ITAL CONSULT***	***DOUBLING TAIF AL BAHA - ABHA ROAD***	Contractor : ***M. A. AL SWAILEM CO.***
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : ITAL CONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : DOUBLING TAIF AL BAHA - ABHA ROAD Page: ___3___ of ___3___

Item : *6-16-1 & 6-16-2A* R.O.W. MONUMENT & BRASS PLATE Drwg. No. _____

LEFT SIDE			STATION	RIGHT SIDE		
Notes	Brass Plate	R.O.W. Monument		R.O.W. Monument	Brass Plate	Notes
			0+670.006	▨		CT-SERV. RD. "A"
			0+000.000	▨		TC-SERV. RD. "B"
			0+044.710	▨		PCC-SERV. RD. "B"
			0+085.615	▨		CT-SERV. RD. "B"
			3+698.710	▨		TC-SERV. RD. "B"
CT-SERV.RD."C"		▨	3+712.030			
TC-SERV.RD."C"		▨	0+592.967			
PCC-SERV.RD."C"		▨	0+625.488			
CT-SERV.RD."C"		▨	0+673.220			
TC-SERV.RD."D"		▨	0+000.000			
PCC-SERV.RD."D"		▨	0+028.211			
CT-SERV.RD."D"		▨	0+071.784			
TC-SERV.RD."D"		▨	3+310.173			
ML-ROW VAR.	●	▨	4+000.000	▨	●	ML-ROW VAR.
PCC-SERV.RD."C"		▨	4+100.000	▨		CT-SER. RD. "B"
ML-ROW =100		▨	4+500.000	▨		ML-ROW =100
ML-ROW =100	●	▨	5+000.000	▨	●	ML-ROW =100
ML-ROW =100		▨	5+500.000	▨		ML-ROW =100
ML-ROW =100	●	▨	6+000.000	▨	●	ML-ROW =100
	3	14	**SUB-TOTAL 2**	11	3	

Suprv'g. Consultant : ITAL CONSULT	DOUBLING TAIF AL BAHA - ABHA ROAD	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL RIYADH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Main Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : *Qassim - Madinah Expressway (Section 1-A)* Page: _1__ of __1__

Item : *6-2-5-1* *RUMBLE STRIP Type "B" (Ceramics)* Drwg. No. _____

6-2-5-1 RUMBLE STRIP Type "B" (Ceramics)

S U M M A R Y

ITEM NO.	DESCRIPTION	UNIT	TOTAL	Ref. Page
6-2-5-1	RUMBLE STRIP Type "B" (Ceramics)	pcs.	1,200	1 of 1
	GRAND TOTAL =	**pcs.**	**1,200**	

Suprv'g. Consultant : DAR AL RIYADH		*Qassim - Madinah Expressway (Section 1-A)*	Contractor: M. A. AL SWAILEM CO.	
Qty. Surveyor	Res. Engineer		Qty. Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Main Contractor :
DAR AL RIYADH	MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

FINAL QUANTITIES
الكميات النهائية

Project : ***Qassim - Madinah Expressway (Section 1-A)*** Page: _1__ of __1__

Item : ***6-2-5-1*** ***RUMBLE STRIP Type "B" (Ceramics)*** Drwg. No. _____

LOCATION		Width (m.)	No. of Strips per Rows	Group Line (6 rows per group line)	Quantity (pcs.)
Main Line (Left)					
1	1+845.000	10.950	23	6	138
2	1+920.000	14.600	30	6	180
3	1+995.000	14.600	30	6	180
4	2+070.000	12.190	25	6	150
Main Line (Right)					
1	5+825.000	10.950	23	6	138
2	5+900.000	10.950	23	6	138
3	5+975.000	10.950	23	6	138
4	6+050.000	10.950	23	6	138
				TOTAL PIECES =	**1,200**

SPACING OF RUMBLE STRIP (Type "B")

RUMBLE STRIPS , TYPE "B"

Suprv'g. Consultant :			Contractor:	
DAR AL RIYADH		***Qassim - Madinah Expressway (Section 1-A)***	***M. A. AL SWAILEM CO.***	
Qty. Surveyor	Res. Engineer		Qty. Surveyor	Proj. Manager

WATER PROTECTION

طبقات العزل البيتومينية

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO LAYERS WATER PROOFING

Date .....

INTERCHANGE 1 - A BRIDGE 1L ABUTMENT 1

	FOOTING PART A	FOOTING PART B	COLUMN PART C
LENGTH	20.00	20.00	2.00
WIDTH	8.00	8.00	0.60
HEIGHT	1.00	-	7.837
AREA	56.00	155.20	40.75
TOTAL AREA		251.950 M^2	
H 1	H 2	H 3	H 4
7.927	7.867	7.807	7.747

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO LAYERS WATER PROOFING

Date .....

INTERCHANGE 1 - A BRIDGE 1R ABUTMENT 2

	FOOTING PART A	FOOTING PART B	COLUMN PART C
LENGTH	15.00	15.00	2.00
WIDTH	8.00	8.00	0.60
HEIGHT	1.00	-	5.917
AREA	46.00	115.20	28.40
TOTAL AREA		189.600 M^2	
H 1	H 2	H 3	H 4
6.007	5.947	5.887	5.827

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO LAYERS WATER PROOFING

Date .....

INTERCHANGE 1 - A BRIDGE 1L PIER 1

	FOOTING PART A	FOOTING PART B	COLUMN PART C
LENGTH	10.00	10.00	5.00
WIDTH	10.00	10.00	2.50
HEIGHT	1.50	-	2.500
AREA	60.00	87.50	37.50
TOTAL AREA		185.000 M^2	

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO LAYERS WATER PROOFING

Date .....

INTERCHANGE 1 - A BRIDGE 1L PIER 1

	FOOTING PART A	FOOTING PART B	COLUMN PART C
LENGTH	10.00	10.00	5.00
WIDTH	10.00	10.00	2.50
HEIGHT	1.50	-	2.500
AREA	60.00	87.50	37.50
TOTAL AREA		185.000 M^2	

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO LAYERS WATER PROOFING

Date .....

INTERCHANGE 1 - A BRIDGE 1L PIER 3

	FOOTING PART A	FOOTING PART B	COLUMN PART C
LENGTH	10.00	10.00	5.00
WIDTH	10.00	10.00	2.50
HEIGHT	1.50	-	2.500
AREA	60.00	87.50	37.50
TOTAL AREA		185.000 M^2	

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO LAYERS WATER PROOFING

Date .....

INTERCHANGE 1 - A BRIDGE 1R PIER 1

	FOOTING PART A	FOOTING PART B	COLUMN PART C
LENGTH	10.00	10.00	5.00
WIDTH	10.00	10.00	2.50
HEIGHT	1.50	-	2.500
AREA	60.00	87.50	37.50
TOTAL AREA		185.000 M^2	

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO LAYERS WATER PROOFING

Date .....

INTERCHANGE 1 - A BRIDGE 1R PIER 2

	FOOTING PART A	FOOTING PART B	COLUMN PART C
LENGTH	10.00	10.00	5.00
WIDTH	10.00	10.00	2.50
HEIGHT	1.50	-	2.500
AREA	60.00	87.50	37.50
TOTAL AREA		185.000 M^2	

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO LAYERS WATER PROOFING

Date .....

INTERCHANGE 1 - A BRIDGE 1R PIER 3

	FOOTING PART A	FOOTING PART B	COLUMN PART C
LENGTH	10.00	10.00	5.00
WIDTH	10.00	10.00	2.50
HEIGHT	1.50	-	2.500
AREA	60.00	87.50	37.50
TOTAL AREA		185.000 M^2	

SECTION A-A

ELEVATION

PLAN

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO COATS WATER PROOFING

Date .....

ABUT 1 (I/C - 1A)

PLAN

SECTION A-A

DETAIL 1

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

CONSULTANT: DAR AL - HANDASAH	THE KINGDOM OF SAUDI ARABIA Ministry of Transportation General Technical Administration	CONTRACTOR: M. A. AL - SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Page. ..... of .....

Project: BURAYDAH RING ROAD

Drwg. No. .....

Item: TWO COATS WATER PROOFING

Date .....

ABUT 1 OF BRIDGE 1L (CROSS HEAD 1)

	SIDES OF CROSSING HEAD A1		BOTTOM OF CROSSING HEAD A2		TWO WING WALL A3	
	A	B	SIZE	COLUMN SIZE	SIZE	DEDUCTION
LENGTH	16.580	15.780	16.58	2.00	1.95	0.50
WIDTH	0.300	4.066	2.30	0.60	4.20	0.40
Nos.	-	-		4	2	
AREA	69.135 m^2		33.334 m^2		15.980 m^2	
TOTAL AREA A^T			118.449 M^2			
FOR ABUT.1 & ABUT 2 OF BR.1L & BR.1R:						
TOTAL AREA OF CROSS HEAD 4 A^T			473.80 M^2			

CONSULTANT	PROJECT	CONTRACTOR
DAR AL - HANDASAH	BURAYDAH RING ROAD	M. ALI AL SWAILEM CO. LTD
Quantity Surveyor / Resident Engineer		Quantity Surveyor / Project Manager

SEC. 9

السلامه المرورية

PART: 9 TRAFFIC CONTROL DEVICES &WORK ZONES

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Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
DAR AL HANDASAH	MINISTRY OF COMMUNICATIONS	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***HHR - MAIN ROAD Sta. 75+000 - 116+000*** Page: _1__ of __3__

Item Description : ***White & Yellow Paint & Reflective Road Stud*** Drwg. No. _____

AREA 2 (JEDDAH SECTOR) Date: _____

Item No. : **90308 & 9030701**

ROAD MARKING (White & Yellow)

REFLECTIVE ROAD STUD

S U M M A R Y

Ser. No.	White Ceramics (pcs)	Yellow Ceramics (pcs)	White Ref. Stud (pcs)	Yellow Ref. Stud (pcs)
1	56,440.72	93,383.63	5,760	10,850
TOTAL	**56,440.72**	**93,384**	**5,760**	**10,850**

Contractor :		Suprv'g. Consultant :	
M. A. AL SWAILEM CO.		***DAR AL HANDASAH***	
Proj. Manager	Q.S	Res. Engr.	Q.S

HARAMAIN HIGH SPEED RAILWAY

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORTATION GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

COMPUTATION OF FINAL QUANTITIES

Project : *HHR - MAIN ROAD Sta. 75+000 - 116+000* — Page: __2_ of __3__

Item Description : *ROAD STUDS (Cat Eyes) & CERAMICS(White & Yellow)* — Drwg. No. _____

AREA 2 (JEDDAH SECTOR) — Date: _____

Item Nos. : 90308 & 9030701

ROAD STUDS (Cat Eyes) & CERAMICS(White & Yellow)

Ser. No.	STATION		LENGTH	ROAD CERAMICS			ROAD STUDS			REMARKS	
	From	To	M	White	Yellow	Pcs.	White	Yellow	Pcs.	Type	Details
MAIN ROAD @ RIGHT SIDE Sta. 76+615 - 107+746.591											
01	76+615.000	77+100.000	485.000	404.01	889.01	1,293	40.42	121.25	162	M1,2,3,4 &5	8
02	77+100.000	77+225.000	125.000	159.75	229.13	389	17.36	31.25	49	M1,2,3,4 &5	9
03	77+225.000	77+533.000	308.000	256.56	376.38	633	25.67	34.22	60	M1,2,3,4 &5	7
04	77+533.000	77+700.000	167.000	139.11	306.11	445	13.92	41.75	56	M1,2,3,4 &5	8
05	77+700.000	77+900.000	200.000	166.60	244.40	411	16.67	22.22	39	M1,2,3,4 &5	7
06	77+900.000	78+261.000	361.000	461.36	661.71	1,123	50.14	90.25	140	M1,2,3,4 &5	9
07	78+261.000	78+800.000	539.000	448.99	987.99	1,437	44.91	134.75	180	M1,2,3,4 &5	8
08	78+800.000	80+338.000	1538.000	1,281.15	1,879.44	3,161	128.16	170.89	299	M1,2,3,4 &5	7
09	80+338.000	80+575.000	237.000	197.42	434.42	632	19.75	59.25	79	M1,2,3,4 &5	8
10	80+575.000	81+050.000	475.000	395.68	580.45	976	39.58	52.78	92	M1,2,3,4 &5	7
11	81+050.000	81+354.000	304.000	253.23	557.23	810	25.33	76.00	101	M1,2,3,4 &5	8
12	81+354.000	81+712.000	358.000	298.21	437.48	736	29.83	39.78	70	M1,2,3,4 &5	7
13	81+712.000	82+800.000	1088.000	906.30	1,994.30	2,901	90.66	272.00	363	M1,2,3,4 &5	8
14	82+800.000	83+114.000	314.000	261.56	383.71	645	26.17	34.89	61	M1,2,3,4 &5	7
15	83+114.000	83+508.000	394.000	328.20	722.20	1,050	32.83	98.50	131	M1,2,3,4 &5	8
16	83+508.000	84+057.000	549.000	457.32	670.88	1,128	45.75	61.00	107	M1,2,3,4 &5	7
17	84+057.000	84+275.000	218.000	278.60	399.59	678	30.28	54.50	85	M1,2,3,4 &5	9
18	84+275.000	84+879.000	604.000	503.13	738.09	1,241	50.33	67.11	117	M1,2,3,4 &5	7
19	84+879.000	88+257.000	3378.000	2,813.87	6,191.87	9,006	281.49	844.50	1,126	M1,2,3,4 &5	8
20	88+257.000	88+739.000	482.000	401.51	589.00	991	40.17	53.56	94	M1,2,3,4 &5	7
21	88+739.000	88+963.000	224.000	286.27	410.59	697	31.11	56.00	87	M1,2,3,4 &5	9
22	88+963.000	89+505.000	542.000	451.49	662.32	1,114	45.16	60.22	105	M1,2,3,4 &5	7
23	89+505.000	90+335.000	830.000	1,060.74	1,521.39	2,582	115.28	207.50	323	M1,2,3,4 &5	9
24	90+335.000	90+520.000	185.000	154.11	226.07	380	15.42	20.56	36	M1,2,3,4 &5	7
25	90+520.000	91+370.000	850.000	1,086.30	1,558.05	2,644	118.06	212.50	331	M1,2,3,4 &5	9
26	91+370.000	91+966.000	596.000	496.47	728.31	1,225	49.66	66.22	116	M1,2,3,4 &5	7
27	91+966.000	92+212.000	246.000	314.39	450.92	765	34.17	61.50	96	M1,2,3,4 &5	9
28	92+212.000	92+639.000	427.000	355.69	521.79	877	35.58	47.44	83	M1,2,3,4 &5	7
29	92+639.000	93+586.000	947.000	1,210.27	1,735.85	2,946	131.53	236.75	368	M1,2,3,4 &5	9
30	93+586.000	93+966.000	380.000	316.54	464.36	781	31.67	42.22	74	M1,2,3,4 &5	7
31	93+966.000	94+325.000	359.000	299.05	658.05	957	29.92	89.75	120	M1,2,3,4 &5	8
32	94+325.000	94+525.000	200.000	166.60	244.40	411	16.67	22.22	39	M1,2,3,4 &5	7
33	94+525.000	94+678.000	153.000	195.53	280.45	476	21.25	38.25	60	M1,2,3,4 &5	9
34	94+678.000	95+566.000	888.000	739.70	1,627.70	2,367	74.00	222.00	296	M1,2,3,4 &5	8
35	95+566.000	98+112.000	2546.000	2,120.82	3,111.21	5,232	212.16	282.89	495	M1,2,3,4 &5	7
36	98+112.000	98+333.000	221.000	282.44	405.09	688	30.69	55.25	86	M1,2,3,4 &5	9
37	98+333.000	98+875.000	542.000	451.49	662.32	1,114	45.16	60.22	105	M1,2,3,4 &5	7
38	98+875.000	99+209.000	334.000	278.22	612.22	890	27.83	83.50	111	M1,2,3,4 &5	8
39	99+209.000	99+537.000	328.000	273.22	400.82	674	27.33	36.44	64	M1,2,3,4 &5	7
40	99+537.000	100+275.000	738.000	614.75	1,352.75	1,968	61.50	184.50	246	M1,2,3,4 &5	8
41	100+275.000	100+375.000	100.000	83.30	122.20	206	8.33	11.11	19	M1,2,3,4 &5	7
42	100+375.000	100+758.000	383.000	319.04	702.04	1,021	31.92	95.75	128	M1,2,3,4 &5	8
43	100+758.000	102+567.000	1809.000	1,506.90	2,210.60	3,717	150.74	201.00	352	M1,2,3,4 &5	7
44	102+567.000	102+859.000	292.000	243.24	535.24	778	24.33	73.00	97	M1,2,3,4 &5	8
45	102+859.000	103+450.000	591.000	492.30	722.20	1,215	49.25	65.67	115	M1,2,3,4 &5	7
46	103+450.000	103+725.000	275.000	351.45	504.08	856	38.19	68.75	107	M1,2,3,4 &5	9
47	103+725.000	105+575.000	1850.000	1,541.05	2,260.70	3,802	154.16	205.55	360	M1,2,3,4 &5	7
48	105+575.000	106+286.000	711.000	592.26	1,303.26	1,896	59.25	177.75	237	M1,2,3,4 &5	8
49	106+286.000	107+746.591	1460.591	1,216.67	1,784.84	3,002	121.71	162.29	284	M1,2,3,4 &5	7
TOTAL =			**31,131.59**	**27,913**	**47,053**	**74,966**	**2,841**	**5,507**	**8,349**		

Contractor : M. A. AL SWAILEM CO.	HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant : DAR AL HANDASAH
Proj. Manager Q.S		Res. Engr. Q.S

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORTATION GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

COMPUTATION OF FINAL QUANTITIES

Project : ***HHR - MAIN ROAD Sta. 75+000 - 116+000*** Page: __3_ of __3__

Item Description : ***ROAD STUDS (Cat Eyes) & CERAMICS(White & Yellow)*** Drwg. No. _____

AREA 2 (JEDDAH SECTOR) Date: _____

Item Nos. : **90308 & 9030701**

ROAD STUDS (Cat Eyes) & CERAMICS(White & Yellow)

Ser. No.	STATION		LENGTH	ROAD CERAMICS			ROAD STUDS			REMARKS	
	From	To	M	White	Yellow	Pcs.	White	Yellow	Pcs.	Type	Details
MAIN ROAD @ LEFT SIDE Sta. 76+615 - 107+746.591											
01	76+615.000	76+982.000	367.000	305.71	672.71	978	30.58	91.75	122	M1,2,3,4 &5	8
02	76+982.000	77+238.000	256.000	327.17	469.25	796	35.56	64.00	100	M1,2,3,4 &5	9
03	77+238.000	77+563.000	325.000	270.73	397.15	668	27.08	36.11	63	M1,2,3,4 &5	7
04	77+563.000	77+730.000	167.000	213.43	306.11	520	23.19	41.75	65	M1,2,3,4 &5	9
05	77+730.000	78+136.000	406.000	338.20	496.13	834	33.83	45.11	79	M1,2,3,4 &5	7
06	78+136.000	78+589.000	453.000	578.93	830.35	1,409	62.92	113.25	176	M1,2,3,4 &5	9
07	78+589.000	80+275.000	1686.000	1,404.44	2,060.29	3,465	140.49	187.33	328	M1,2,3,4 &5	7
08	80+275.000	80+690.000	415.000	530.37	760.70	1,291	57.64	103.75	161	M1,2,3,4 &5	9
09	80+690.000	81+176.000	486.000	404.84	593.89	999	40.50	54.00	94	M1,2,3,4 &5	7
10	81+176.000	81+346.000	170.000	141.61	311.61	453	14.17	42.50	57	M1,2,3,4 &5	8
11	81+346.000	81+727.000	381.000	317.37	465.58	783	31.75	42.33	74	M1,2,3,4 &5	7
12	81+727.000	81+812.000	85.000	108.63	155.81	264	11.81	21.25	33	M1,2,3,4 &5	9
13	81+812.000	82+389.000	577.000	480.64	1,057.64	1,538	48.08	144.25	192	M1,2,3,4 &5	8
14	82+389.000	82+678.000	289.000	240.74	353.16	594	24.08	32.11	56	M1,2,3,4 &5	7
15	82+678.000	82+849.000	171.000	142.44	313.44	456	14.25	42.75	57	M1,2,3,4 &5	8
16	82+849.000	83+035.000	186.000	154.94	227.29	382	15.50	20.67	36	M1,2,3,4 &5	7
17	83+035.000	83+434.000	399.000	332.37	731.37	1,064	33.25	99.75	133	M1,2,3,4 &5	8
18	83+434.000	83+662.000	228.000	291.38	417.92	709	31.67	57.00	89	M1,2,3,4 &5	9
19	83+662.000	84+055.000	393.000	327.37	480.25	808	32.75	43.67	76	M1,2,3,4 &5	7
20	84+055.000	84+259.000	204.000	260.71	373.93	635	28.33	51.00	79	M1,2,3,4 &5	9
21	84+259.000	84+495.000	236.000	196.59	288.39	485	19.67	26.22	46	M1,2,3,4 &5	7
22	84+495.000	84+661.000	166.000	212.15	304.28	516	23.06	41.50	65	M1,2,3,4 &5	9
23	84+661.000	88+250.000	3589.000	2,989.64	6,578.64	9,568	299.07	897.25	1,196	M1,2,3,4 &5	8
24	88+250.000	88+737.000	487.000	405.67	595.11	1,001	40.58	54.11	95	M1,2,3,4 &5	7
25	88+737.000	88+950.000	213.000	272.21	390.43	663	29.58	53.25	83	M1,2,3,4 &5	9
26	88+950.000	89+444.000	494.000	411.50	603.67	1,015	41.17	54.89	96	M1,2,3,4 &5	7
27	89+444.000	91+392.000	1948.000	2,489.54	3,570.68	6,060	270.56	487.00	758	M1,2,3,4 &5	9
28	91+392.000	91+984.000	592.000	493.14	723.42	1,217	49.33	65.78	115	M1,2,3,4 &5	7
29	91+984.000	92+240.000	256.000	327.17	469.25	796	35.56	64.00	100	M1,2,3,4 &5	9
30	92+240.000	92+825.000	585.000	487.31	714.87	1,202	48.75	65.00	114	M1,2,3,4 &5	7
31	92+825.000	93+883.000	1058.000	1,352.12	1,939.31	3,291	146.95	264.50	411	M1,2,3,4 &5	9
32	93+883.000	94+463.000	580.000	483.14	708.76	1,192	48.33	64.44	113	M1,2,3,4 &5	7
33	94+463.000	94+578.000	115.000	95.80	210.80	307	9.58	28.75	38	M1,2,3,4 &5	8
34	94+578.000	94+688.000	110.000	140.58	201.63	342	15.28	27.50	43	M1,2,3,4 &5	9
35	94+688.000	95+200.000	512.000	426.50	625.66	1,052	42.66	56.89	100	M1,2,3,4 &5	7
36	95+200.000	95+440.000	240.000	199.92	439.92	640	20.00	60.00	80	M1,2,3,4 &5	8
37	95+440.000	97+212.000	1772.000	1,476.08	2,165.38	3,641	147.66	196.89	345	M1,2,3,4 &5	7
38	97+212.000	97+504.000	292.000	243.24	535.24	778	24.33	73.00	97	M1,2,3,4 &5	8
39	97+504.000	98+100.000	596.000	496.47	728.31	1,225	49.66	66.22	116	M1,2,3,4 &5	7
40	98+100.000	98+385.000	285.000	237.41	522.41	760	23.75	71.25	95	M1,2,3,4 &5	8
41	98+385.000	98+928.000	543.000	452.32	663.55	1,116	45.25	60.33	106	M1,2,3,4 &5	7
42	98+928.000	99+226.000	298.000	248.23	546.23	794	24.83	74.50	99	M1,2,3,4 &5	8
43	99+226.000	100+010.000	784.000	653.07	958.05	1,611	65.33	87.11	152	M1,2,3,4 &5	7
44	100+010.000	100+469.000	459.000	382.35	841.35	1,224	38.25	114.75	153	M1,2,3,4 &5	8
45	100+469.000	100+525.000	56.000	46.65	68.43	115	4.67	6.22	11	M1,2,3,4 &5	7
46	100+525.000	100+711.000	186.000	154.94	340.94	496	15.50	46.50	62	M1,2,3,4 &5	8
47	100+711.000	102+536.000	1825.000	1,520.23	2,230.15	3,750	152.08	202.78	355	M1,2,3,4 &5	7
48	102+536.000	102+828.000	292.000	243.24	535.24	778	24.33	73.00	97	M1,2,3,4 &5	8
49	102+828.000	103+452.000	624.000	519.79	762.53	1,282	52.00	69.33	121	M1,2,3,4 &5	7
50	103+452.000	103+725.000	273.000	348.89	500.41	849	37.92	68.25	106	M1,2,3,4 &5	9
51	103+725.000	104+315.000	590.000	491.47	720.98	1,212	49.16	65.55	115	M1,2,3,4 &5	7
52	104+315.000	104+607.000	292.000	243.24	535.24	778	24.33	73.00	97	M1,2,3,4 &5	8
53	104+607.000	107+746.590	3139.590	2,615.28	3,836.58	6,452	261.62	348.84	610	M1,2,3,4 &5	7
TOTAL =			**31,131.59**	**28,528**	**46,330**	**74,858**	**2,918**	**5,343**	**8,261**		

Contractor : M. A. AL SWAILEM CO.	HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant : DAR AL HANDASAH
Proj. Manager Q.S		Res. Engr. Q.S

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF FINAL QUANTITIES

Project : *HARAMAIN HIGH SPEED RAILWAY* Page: __1_ of __10__

Item Description : *WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS* Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : *90308 & 9030701*

DETAIL-1

2 - LANES ROAD

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 x 2 = 44 pcs.	YELLOW = 44/36 = 1.222 pc / m
WHITE =10 x 1 = 10 pcs.	WHITE =10/36 = 0.278 pc / m

NO. OF REF. STUD FOR 36m. LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW = 2 x 2 = 4	YELLOW =4 / 36 = 0.11111 pc / m
WHITE =1 x 1 = 1	WHITE =1/ 36 = 0.02778 pc / m
	TOTAL = 0.1389 pc/m.

Contractor : M. A. AL SWAILEM CO.	HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant : DAR AL HANDASAH
Proj. Manager Q.S		Res. Engr. Q.S

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF FINAL QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __2_ of __10__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : ***90308 & 9030701***

DETAIL-2

2 - LANES ROAD WITH ACCELERATION & DECELERATION

CONTINEOUS YELLOW & BROKEN WHITE PLUS DOTTED YELLOW

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 + 24 + 20 = 66 pcs. WHITE =10 x 1 = 10 pcs.	YELLOW =66/36 = 1.833 pc / m WHITE = 10/36 = 0.278 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 + 3 + 4=9 WHITE =1 x 1 = 1	YELLOW =9 / 36 = 0.25 pc / m WHITE =1/ 36 = 0.02778 pc / m TOTAL = 0.2778 pc/m.

Contractor : M. A. AL SWAILEM CO.	HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant : DAR AL HANDASAH
Proj. Manager Q.S		Res. Engr. Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
DAR AL HANDASAH	MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __3_ of __10__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : ***90308 & 9030701***

DETAIL-3

2 - LANES ROAD WITH ACCELERATION & DECELERATION

CONTINEOUS YELLOW & BROKEN WHITE PLUS DOTTED YELLOW

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 + 24 + 20 = 66 pcs.	YELLOW =66/36 = 1.833 pc / m
WHITE =10 x 1 + 16= 26 pcs.	WHITE = 26/36 = 0.722 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 + 3 + 4=9	YELLOW =9 / 36 = 0.25 pc / m
WHITE =1 x 1 +2= 3	WHITE =3/ 36 = 0.08333 pc / m
	TOTAL = 0.3333 pc/m.

Contractor :		HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant :	
M. A. AL SWAILEM CO.			***DAR AL HANDASAH***	
Proj. Manager	Q.S		Res. Engr.	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor :
DAR AL HANDASAH		***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __4_ of __10__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : ***90308 & 9030701***

DETAIL-4

3 - LANES ROAD

CONTINEOUS YELLOW & BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 x 2 = 44 pcs.	YELLOW = 44/36 = 1.222 pc / m
WHITE =10 x 2 = 20 pcs.	WHITE = 20/36 = 0.556 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 x 2 = 4	YELLOW =4 / 36 = 0.11111 pc / m
WHITE =1 x 2 = 2	WHITE =2/ 36 = 0.05556 pc / m
	TOTAL = 0.1667 pc/m.

Contractor :		HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant :	
M. A. AL SWAILEM CO.			***DAR AL HANDASAH***	
Proj. Manager	Q.S		Res. Engr.	Q.S

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF FINAL QUANTITIES

Project : *HARAMAIN HIGH SPEED RAILWAY* Page: __5_ of __10__

Item Description : *WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS* Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : *90308 & 9030701*

DETAIL-5

3 - LANES ROAD WITH ACCELERATION & DECELERATION

CONTINEOUS YELLOW & BROKEN WHITE PLUS DOTTED YELLOW

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 + 24 + 20 = 66 pcs. WHITE =10 x 2 = 20 pcs.	YELLOW =66/36 = 1.833 pc / m WHITE = 20/36 = 0.556 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 + 3 + 4=9 WHITE =1 x 2 = 2	YELLOW =9 / 36 = 0.25 pc / m WHITE =2/ 36 = 0.05556 pc / m TOTAL = 0.3056 pc/m.

Contractor : M. A. AL SWAILEM CO.	HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant : DAR AL HANDASAH
Proj. Manager Q.S		Res. Engr. Q.S

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF FINAL QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __6_ of __10__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : ***90308 & 9030701***

DETAIL-6

3 - LANES ROAD WITH ACCELERATION & DECELERATION

CONTINEOUS YELLOW & BROKEN WHITE PLUS DOTTED YELLOW

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 + 24 + 20 = 66 pcs.	YELLOW =66/36 = 1.833 pc / m
WHITE =10 x 2 + 16= 36 pcs.	WHITE = 36/36 = 1.000 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 + 3 + 4=9	YELLOW =9 / 36 = 0.25 pc / m
WHITE =1 x 2 +2= 4	WHITE =4/ 36 = 0.11111 pc / m
	TOTAL = 0.3611 pc/m.

Contractor : M. A. AL SWAILEM CO.	HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant : DAR AL HANDASAH
Proj. Manager Q.S		Res. Engr. Q.S

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF FINAL QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __7_ of __10__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : ***90308 & 9030701***

DETAIL-7

4 - LANES ROAD

CONTINEOUS YELLOW & BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 x 2 = 44 pcs. WHITE =10 x 3 =30 pcs.	YELLOW = 44/36 = 1.222 pc / m WHITE = 30/36 = 0.833 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 x 2 = 4 WHITE =1 x 3 = 3	YELLOW =4 / 36 = 0.11111 pc / m WHITE =3/ 36 = 0.08333 pc / m TOTAL = 0.1944 pc/m.

Contractor : M. A. AL SWAILEM CO.	HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant : DAR AL HANDASAH
Proj. Manager Q.S		Res. Engr. Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor :
DAR AL HANDASAH		***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __8_ of __10__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : ***90308 & 9030701***

DETAIL-8

4 - LANES ROAD WITH ACCELERATION & DECELERATION

CONTINEOUS YELLOW & BROKEN WHITE PLUS DOTTED YELLOW

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 + 24 + 20 = 66 pcs.	YELLOW =66/36 = 1.833 pc / m
WHITE =10 x3 =30 pcs.	WHITE =30/36 = 0.833 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 + 3 + 4=9	YELLOW =9 / 36 = 0.25 pc / m
WHITE =1 x 3= 3	WHITE =3/ 36 = 0.08333 pc / m
	TOTAL = 0.3333 pc/m.

Contractor :		HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant :	
M. A. AL SWAILEM CO.			***DAR AL HANDASAH***	
Proj. Manager	Q.S		Res. Engr.	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor :
DAR AL HANDASAH		***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __9_ of __10__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : ***90308 & 9030701***

DETAIL-9

4 - LANES ROAD WITH ACCELERATION & DECELERATION

CONTINEOUS YELLOW & BROKEN WHITE PLUS DOTTED YELLOW

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 22 + 24 + 20 = 66 pcs.	YELLOW =66/36 = 1.833 pc / m
WHITE =10 x3 + 16=46 pcs.	WHITE = 46/36 = 1.278 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 + 3 + 4=9	YELLOW =9 / 36 = 0.25 pc / m
WHITE =1 x 3 +2= 5	WHITE =5/ 36 = 0.13889 pc / m
	TOTAL = 0.3889 pc/m.

Contractor :		HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant :	
M. A. AL SWAILEM CO.			***DAR AL HANDASAH***	
Proj. Manager	Q.S		Res. Engr.	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor :
DAR AL HANDASAH		***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __10_ of __10__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

AREA-2 (JEDDAH SECTOR)

Item No. : ***90308 & 9030701***

DETAIL-10

2 - LANES ROAD @ (RAMPS & LOOPS)

CONTINEOUS YELLOW & BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 18m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 10 x 2 = 20 pcs.	YELLOW = 20/18 = 1.111 pc / m
WHITE = 8 x 1 = 8 pcs.	WHITE = 8/18 = 0.444 pc / m
NO. OF REF. STUD FOR 18m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 2 x 2 = 4	YELLOW =4 / 18 = 0.22222 pc / m
WHITE =1 x 1 = 1	WHITE =1/18 = 0.05556 pc / m
	TOTAL = 0.2778 pc/m.

Contractor :		HARAMAIN HIGH SPEED RAILWAY	Suprv'g. Consultant :	
M. A. AL SWAILEM CO.			***DAR AL HANDASAH***	
Proj. Manager	Q.S		Res. Engr.	Q.S

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __2_ of _5_

AREA-2 (JEDDAH SECTOR) Drwg. No. _____

Item : ***90308*** ***CERAMICS (Yellow)*** Date: _____

90308 **CERAMICS (Yellow)**

TYPICAL MEASUREMENT FOR CERAMICS

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
90308	CERAMICS (Yellow)	PCS.	262,953.830	Page: __1_ of _5_
	Grand total	PCS.	262,953.830	

Suprv'g. Consultant : DAR AL HANDASAH	HARAMAIN HIGH SPEED RAILWAY	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __3_ of _5_

AREA-2 (JEDDAH SECTOR) Drwg. No. _____

Item : ***90308*** ***CERAMICS (White)*** Date: _____

90308 CERAMICS (White)

TYPICAL MEASUREMENT FOR CERAMICS

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
90308	CERAMICS (White)	PCS.	118,562.384	Page: __1_ of _5_
	Grand total	PCS.	118,562.384	

Suprv'g. Consultant : DAR AL HANDASAH	HARAMAIN HIGH SPEED RAILWAY	Contractor : M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

COMPUTATION OF QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __4_ of _5_

AREA-2 (JEDDAH SECTOR) Drwg. No. _____

Item : ***9030701*** **CAT EYES (Yellow-Single Face)** Date:_____

9030701 CAT EYES (Yellow-Single Face)

TYPICAL MEASUREMENT FOR CAT EYES

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
9030701	CAT EYES (Yellow-Single Face)	PCS.	13,004.000	Page: __1_ of _5_
	Grand total	PCS.	13,004.000	

COMPUTATION OF QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __5_ of _5_

AREA-2 (JEDDAH SECTOR) Drwg. No. _____

Item : ***9030701*** **CAT EYES (White-Single Face)** Date:_____

9030701 CAT EYES (White-Single Face)

TYPICAL MEASUREMENT FOR CAT EYES

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
9030701	CAT EYES (White-Single Face)	PCS.	33,627.202	Page: __1_ of _5_
	Grand total	PCS.	33,627.202	

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

COMPUTATION OF QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __1_ of _5_

AREA-2 (JEDDAH SECTOR) Drwg. No. _____

Item No. : ***90303 & 9030701*** Date: _____

SUMMARY

LOCATION	DISTANCE (m)	ITEM DESCRIPTION					
		ROAD CERAMICS			ROAD STUDS		
		White	Yellow	Pcs.	White	Yellow	Pcs.
MAIN ROAD (Sta. 76+615 - 107+746.591)	62,263.18	56,441	93	56,534	5,760	10,850	16,610
(KING ABDULAH) X-Road, Service Road, Ramps, Loops, Gores & Arrows	12,516.99	18,298	16,915	35,213	620	2,053	2,673
NORTH EXIT RAMP - 1 & 2 @ KING ABDULLAH INT.	2,568.74	714	3,139	3,853	71	285	356
(PALESTINE) LOOP 2, RAMP 2,3 & 6	1,608.680	1273.0000	1325.0000	2,598	66	265	331
(TAHLIYAH) X-Road, Service Road, Ramps, Loops, Gores & Arrows	13,519.81	17,556	17,117	34,673	557	2,362	2,919
(BRAIMAN) X-Road, Service Road, Ramps, Loops, Gores & Arrows	13,649.87	95,122	17,367	112,489	677	2,565	3,242
(AIR PORT EAST) X-Road, Service Road, Ramps, Loops, Gores & Arrows	13,592.48	19,443	16,477	35,920	772	2,466	3,238
AIR DEFFENSE) X-Road, Service Road, Ramps, Loops, Gores & Arrows	10,944.23	16,939	13,148	30,087	3,182	8,221	11,403
(AIR FORCE BASE) X-Road, Service Road, Ramps, Loops, Gores & Arrows	10,164.20	16,469	12,576	29,045	445	1,909	2,354
(AL HAJJ) X-Road, Service Road, Ramps, Loops, Gores & Arrows	16,362.10	20,699	20,405	41,104	854	2,651	3,505
GRAND TOTAL =	**157,190.280**	**262,954**	**118,562**	**381,516**	**13,004**	**33,627**	**46,631**

Suprv'g. Consultant : DAR AL HANDASAH	Contractor : HARAMAIN HIGH SPEED RAILWAY	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT SAUDI RAILWAY ORGANIZATION	Contractor : AL RAHJI ALLIANCE

COMPUTATION OF QUANTITIES

Project : **HARAMAIN HIGHSPEED RAILWAY** Page: __1_ of _1_

Item : ***9030301*** **WHITE ROAD PAINT** Drwg. No. _____

9030301 WHITE ROAD PAINT

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
9030301	WHITE ROAD PAINT	M2	153.200	
	Grand total	M2	153.200	

Suprv'g. Consultant : DAR AL HANDASAH	HARAMAIN HIGHSPEED RAILWAY	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
DAR AL HANDASAH	MINISTRY OF TRANSPORT	***AL RAHJI ALLIANCE***
	SAUDI RAILWAY ORGANIZATION	

COMPUTATION OF QUANTITIES

Project : **HARAMAIN HIGHSPEED RAILWAY** Page: __1_ of _1_

Item : ***9030302*** **YELLOW ROAD PAINT** Drwg. No. _____

9030302 **YELLOW ROAD PAINT**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
9030302	YELLOW ROAD PAINT	M2	763.000	
	Grand total	M2	763.000	

Suprv'g. Consultant :		Contractor :	
DAR AL HANDASAH	HARAMAIN HIGHSPEED RAILWAY	***AL RAHJI ALLIANCE***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
DAR AL HANDASAH	MINISTRY OF TRANSPORT	***AL RAHJI ALLIANCE***
	SAUDI RAILWAY ORGANIZATION	

COMPUTATION OF QUANTITIES

Project : **HARAMAIN HIGHSPEED RAILWAY** Page: __1_ of _1_

Item : ***9030701*** **PAVEMENT MARKERS (CAT EYES)** Drwg. No. _____

9030701 PAVEMENT MARKERS (CAT EYES)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
9030701	PAVEMENT MARKERS (CAT EYES)	PCS.	47,013	
	Grand total	PCS.	47,013	

Suprv'g. Consultant :		Contractor :	
DAR AL HANDASAH	HARAMAIN HIGHSPEED RAILWAY	***AL RAHJI ALLIANCE***	
Quantity Surveyor	Res. Engineer	Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
DAR AL HANDASAH	MINISTRY OF TRANSPORT	***AL RAHJI ALLIANCE***
	SAUDI RAILWAY ORGANIZATION	

COMPUTATION OF QUANTITIES

Project : **HARAMAIN HIGHSPEED RAILWAY** Page: __1_ of _1_

Item : ***90308*** **CERAMICS RAISED PAVEMENT MARKER** Drwg. No. _____

90308 **CERAMICS RAISED PAVEMENT MARKER**

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
90308	CERAMICS RAISED PAVEMENT MARKER	PCS.	381,516	
	Grand total	PCS.	381,516	

Suprv'g. Consultant :		HARAMAIN HIGHSPEED RAILWAY	Contractor :	
DAR AL HANDASAH			***AL RAHJI ALLIANCE***	
Quantity Surveyor	Res. Engineer		Quantity Surveyor	Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
DAR AL HANDASAH	**MINISTRY OF TRANSPORTATION**	***AL RAHJI ALLIANCE***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***ROAD PAINT ALONG HHR (INT, CR, SR, FR, ACC & LINK)*** Page: __-_ of __-__

Item Description : ***WHITE , YELLOW ROAD MARKING PAINT & ROAD STUDS*** Drwg. No. _____

Date: _____

Item Nos. : **90303 & 9030701**

ROAD MARKING PAINT (White & Yellow) & ROAD STUDS

No.	LOCATION	Length	Road Paint			Road Studs	Remarks	
		M	White	Yellow	Area	Nos	Pattern	Details
Right Side								
1	**FRONTAGE ROAD, CROSS ROAD**	1906.493	153.200	763.000	4780.82	382.000	38A & 10A	1
TOTAL =		**######**	**153.20**	**763.00**	**######**	**382.00**		

Contractor :		
AL RAHJI ALLIANCE	**ROAD PAINT ALONG HHR (INT, CR, SR, FR, ACC & LINK)**	***DAR AL HANDASAH***
Proj. Manager Q.S		Res. Engineer Q.S

Suprv'g. Consultant : DAR AL HANDASAH	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : AL RAHJI ALLIANCE

COMPUTATION OF QUANTITIES

Project : ***HARAMAIN HIGH SPEED RAILWAY*** Page: __1_ of _5_

AREA-2 (JEDDAH SECTOR) Drwg. No. _____

Item No. : ***90303 & 9030701*** Date: _____

SUMMARY

LOCATION	DISTANCE (m)	ITEM DESCRIPTION					
		ROAD CERAMICS			ROAD STUDS		
		White	Yellow	Pcs.	White	Yellow	Pcs.
MAIN ROAD (Sta. 76+615 - 107+746.591)	62,263.18	56,441	93	56,534	5,760	10,850	16,610
(KING ABDULAH) X-Road, Service Road, Ramps, Loops, Gores & Arrows	12,516.99	18,298	16,915	35,213	620	2,053	2,673
NORTH EXIT RAMP - 1 & 2 @ KING ABDULLAH INT.	2,568.74	714	3,139	3,853	71	285	356
(PALESTINE) LOOP 2, RAMP 2,3 & 6	1608.680	1273.000	1325.000	2,598	66	265	331
(TAHLIYAH) X-Road, Service Road, Ramps, Loops, Gores & Arrows	13,519.81	17,556	17,117	34,673	557	2,362	2,919
(BRAIMAN) X-Road, Service Road, Ramps, Loops, Gores & Arrows	13,649.87	95,122	17,367	112,489	677	2,565	3,242
(AIR PORT EAST) X-Road, Service Road, Ramps, Loops, Gores & Arrows	13,592.48	19,443	16,477	35,920	772	2,466	3,238
AIR DEFFENSE) X-Road, Service Road, Ramps, Loops, Gores & Arrows	10,944.23	16,939	13,148	30,087	3,182	8,221	11,403
(AIR FORCE BASE) X-Road, Service Road, Ramps, Loops, Gores & Arrows	10,164.20	16,469	12,576	29,045	445	1,909	2,354
(AL HAJJ) X-Road, Service Road, Ramps, Loops, Gores & Arrows	16,362.10	20,699	20,405	41,104	854	2,651	3,505
GRAND TOTAL =	**157,190.280**	**262,954**	**118,562**	**381,516**	**13,004**	**33,627**	**46,631**

Suprv'g. Consultant : DAR AL HANDASAH	HARAMAIN HIGH SPEED RAILWAY	Contractor : AL RAHJI ALLIANCE
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF COMMUNICATIONS	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

FINAL SUMMARY

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White & Yellow Ceramics & Reflective Road Stud***

Item No. : **9030701 & 90308**

White & Yellow Ceramics & Reflective Road Stud

9030701 & 90308

ASFAN INTERCHANGE 2

LOCATION	White Ceramics (pcs)	Yellow Ceramics (pcs)	White Ref. Stud (pcs.)	Yellow Ref. Stud (pcs.)	REMARKS
RAMP A	326	1,328	65	266	
RAMP B	390	1,592	78	318	
RAMP C	375	1,500	75	300	
RAMP D	256	1,042	51	208	
LOOP A	149	619	30	124	
LOOP B	147	589	29	118	
LOOP C	172	711	34	142	
LOOP D	143	592	29	118	
TOTAL	**1,958**	**7,972**	**392**	**1,594**	
GRAND TOTAL =	**9,930**		**1,986**		

Suprv'g. Consultant :		HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor:	
EUROCONSULT			***M. A. AL SWAILEM CO.***	
Resident Eng'r	Q.S		Pro. Manager	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White & Yellow Ceramics & Reflective Road Stud*

Item Nos. : 9030701 & 90308

ASFAN INTERCHANGE 2

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
RAMP A											
1	0+000.000	0+100.000	100.000	28	111	139	6	22	28	M2 & M3	1
2	0+100.000	0+140.000	40.000	11	67	78	2	13	16	M2 & M3	11
2	0+140.000	1+175.000	1035.000	287	1,150	1,437	57	230	287	M2 & M3	1
		TOTAL =		**326**	**1,328**	**1,654**	**65**	**266**	**331**		
RAMP B											
2	0+120.000	0+245.000	125.000	35	139	174	7	28	35	M2 & M3	1
3	0+245.000	0+300.000	55.000	15	92	107	3	18	21	M2 & M3	11
4	0+300.000	1+000.000	700.000	194	778	972	39	156	194	M2 & M3	1
5	1+000.000	1+525.000	525.000	146	583	729	29	117	146	M2 & M3	1
		TOTAL =		**390**	**1,592**	**1,982**	**78**	**318**	**396**		
RAMP C											
1	0+025.000	0+300.000	275.000	76	306	382	15	61	76	M2 & M3	1
2	0+300.000	0+600.000	300.000	83	333	417	17	67	83	M2 & M3	1
3	0+600.000	0+900.000	300.000	83	333	417	17	67	83	M2 & M3	1
4	0+900.000	1+100.000	200.000	56	222	278	11	44	56	M2 & M3	1
5	1+100.000	1+375.000	275.000	76	306	382	15	61	76	M2 & M3	1
		TOTAL =		**375**	**1,500**	**1,875**	**75**	**300**	**375**		
RAMP D											
1	0+030.000	0+095.000	65.000	18	72	90	4	14	18	M2 & M3	1
2	0+095.000	0+130.000	35.000	10	58	68	2	12	14	M2 & M3	11
3	0+130.000	0+950.000	820.000	228	911	1,139	46	182	228	M2 & M3	1
		TOTAL =		**256**	**1,042**	**1,297**	**51**	**208**	**259**		
LOOP A											
1	0+040.000	0+055.000	15.000	4	17	21	1	3	4	M2 & M3	1
2	0+055.000	0+100.000	45.000	12	75	87	2	15	17	M2 & M3	11
3	0+100.000	0+575.000	475.000	132	528	660	26	106	132	M2 & M3	1
		TOTAL =		**149**	**619**	**768**	**30**	**124**	**154**		
LOOP B											
1	0+000.000	0+100.000	100.000	28	111	139	6	22	28	M2 & M3	1
2	0+100.000	0+530.000	430.000	119	478	597	24	96	119	M2 & M3	1
		TOTAL =		**147**	**589**	**736**	**29**	**118**	**147**		
LOOP C											
1	0+040.000	0+060.000	20.000	6	22	28	1	4	6	M2 & M3	1
2	0+060.000	0+100.000	40.000	11	67	78	2	13	16	M2 & M3	11
3	0+100.000	0+660.000	560.000	156	622	778	31	124	156	M2 & M3	1
		TOTAL =		**172**	**711**	**883**	**34**	**142**	**177**		
LOOP D											
1	0+045.000	0+075.000	30.000	8	33	42	2	7	8	M2 & M3	1
2	0+075.000	0+110.000	35.000	10	58	68	2	12	14	M2 & M3	11
3	0+110.000	0+560.000	450.000	125	500	625	25	100	125	M2 & M3	1
		TOTAL =		**143**	**592**	**735**	**29**	**118**	**147**		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m **D1**	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m **D7**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 20/36 = 0.556 pc / m **D2**	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m **D8**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.3333 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m **D3**	YELLOW = 60/36 = 1.667 pc / m WHITE = 20/36 = 0.556 pc / m **D9**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m **D4**	YELLOW = 40/36 = 1.111 pc / m **D10**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 40/36 = 1.111 pc / m **D5**	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m **D11**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =8/ 36 = 0.22222 pc / m TOTAL = 0.5556 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =40/36 = 1.111 pc / m WHITE = 50/36 = 1.389 pc / m **D6**	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m **D12**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE = 10 / 36 = 0.27778 pc / m TOTAL = 0.5000 pc/m.	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant : *EUROCONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF COMMUNICATIONS GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

COMPUTATION OF FINAL QUANTITIES

Project : *HIGHWAY TYING KASC IN JEDDAH* Page: __1_ of __12__

Item Description : *WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS* Drwg. No. _____

Item No. : *90308 & 9030701*

DETAIL 1

2 - LANES ROAD

TWO CONTINEOUS YELLOW &ONE BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 x 2 = 40 pcs. WHITE = 10 x 1 = 10 pcs.	YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 2 = 8 WHITE =2 x 1 = 2	YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.

Suprv'g. Consultant : *EUROCONSULT*	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor: *M. A. AL SWAILEM CO.*
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __2_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 2

3 - LANES ROAD

TWO CONTINEOUS YELLOW & TWO BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 x 2 = 40pcs.	YELLOW = 40/36 = 1.111 pc / m
WHITE =10 x 2 = 20 pcs.	WHITE = 20/36 = 0.556 pc / m

NO. OF REF. STUD FOR 36m. LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW = 4 x 2 = 8	YELLOW =8 / 36 = 0.22222 pc / m
WHITE =2 x 2 = 4	WHITE =4/ 36 = 0.11111 pc / m
	TOTAL = 0.3333 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __3_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 3

4 - LANES ROAD

TWO CONTINEOUS YELLOW & THREE BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 x 2 = 40 pcs. WHITE =10 x 3 =30 pcs.	YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 2 = 8 WHITE =2 x 3 = 6	YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __4_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 4

3 - LANES ROAD WITH ACCELERATION & DECELERATION

THREE CONTINEOUS YELLOW & THREE BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 X 2 + 21 = 61 pcs. WHITE =10 x 3= 30 pcs.	YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 + 4 + 4=12 WHITE =2 x 3= 6	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __5_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 5

4 - LANES ROAD WITH ACCELERATION & DECELERATION

THREE CONTINEOUS YELLOW & FOUR BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 X 2+21 = 61 pcs.	YELLOW =61/36 = 1.694 pc / m
WHITE =10 x4=40 pcs.	WHITE = 40/36 = 1.111 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 2 + 4=12	YELLOW =12 / 36 = 0.33333 pc / m
WHITE =2 x 4= 8	WHITE =8/ 36 = 0.22222 pc / m
	TOTAL = 0.5556 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __6_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 6

6 - LANES ROAD

TWO CONTINEOUS YELLOW & FIVE BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 X 2= 40 pcs.	YELLOW =40/36 = 1.111 pc / m
WHITE =10 x 5 = 50 pcs.	WHITE = 50/36 = 1.389 pc / m

NO. OF REF. STUD FOR 36m. LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW = 4 x 2 = 8	YELLOW =8 / 36 = 0.22222 pc / m
WHITE =2 x 5 = 10	WHITE = 10 / 36 = 0.27778 pc / m
	TOTAL = 0.5000 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __7_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 7

5 - LANES ROAD

TWO CONTINEOUS YELLOW & FOUR BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 X 2= 40 pcs. WHITE =10 x 4 = 40 pcs.	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 2 = 8 WHITE =2 x 4 = 8	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __8_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 8

4 - LANES ROAD

THREE CONTINEOUS YELLOW & THREE BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 X 3 = 60 pcs. WHITE =10 x3=30 pcs.	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 3=12 WHITE =2 x 3= 6	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __9_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL9

3 - LANES ROAD

THREE CONTINEOUS YELLOW & TWO BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 x3 = 60pcs.	YELLOW = 60/36 = 1.667 pc / m
WHITE =10 x 2 = 20 pcs.	WHITE = 20/36 = 0.556 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 3 = 12	YELLOW =12 / 36 = 0.33333 pc / m
WHITE =2 x 2 = 4	WHITE =4/ 36 = 0.11111 pc / m
	TOTAL = 0.4444 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __10_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 10

1 - LANE ROAD

TWO CONTINEOUS YELLOW

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 x 2 = 40 pcs.	YELLOW = 40/36 = 1.111 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 2 = 8	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __11_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 11

2 - LANES ROAD

THREE CONTINEOUS YELLOW &ONE BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 x 3 = 60 pcs. WHITE = 10 x 1 = 10 pcs.	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 3 =12 WHITE =2 x 1 = 2	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __12_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 12

2 - LANES ROAD

FOUR CONTINEOUS YELLOW &ONE BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 x 4 =80 pcs. WHITE = 10 x 1 = 10 pcs.	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 4 =16 WHITE =2 x 1 = 2	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : *EUROCONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL SUMMARY

Project : HIGHWAYS TYING KASC IN JEDDAH & RELEVANT JUNCTIONS

Item : *9030701* RETRO REFLECTIVE RAISED PAVEMENT MARKERS (Cat's Eye)

9030701 RETRO REFLECTIVE RAISED PAVEMENT MARKERS (Cat's Eye)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
9030701	RETRO REFLECTIVE RAISED PAVEMENT MARKERS (Cat's Eye)	PCS.	17,494.000	
	Grand total	PCS.	17,494.000	

Suprv'g. Consultant : *EUROCONSULT*	HIGHWAYS TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

FINAL SUMMARY

Project : HIGHWAYS TYING KASC IN JEDDAH & RELEVANT JUNCTIONS
Item : *90308* CERAMICS (WHITE & YELLOW)

90308 CERAMICS (WHITE & YELLOW)

SUMMARY

Item NO.	DESCRIPTION	UNIT	TOTAL	REFERENCE PAGE
90308	CERAMICS (WHITE & YELLOW)	PCS.	132,935.000	
	Grand total	PCS.	132,935.000	

Suprv'g. Consultant : *EUROCONSULT*	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : *M. A. AL SWAILEM CO.*

FINAL SUMMARY

Project : HIGHWAYS TYING KASC IN JEDDAH & RELEVANT JUNCTIONS

Item : *9030701* RETRO REFLECTIVE RAISED PAVEMENT MARKERS (Cat's Eye)

90308 CERAMICS (White & Yellow)

		ITEM NO. & DESCRIPTION				REMARKS
		90308		9030701		
LOCATION	DISTANCE (m)	WHITE CERAMICS	YELLOW CERAMICS	YELLOW CERAMICS	WHITE ROAD STUDS	
AL HARAMAIN	7,400.000	1,445	5,891	289	1,165	
ROADS 1, 2 & 3	12,492.818	15,797	28,400	3,159	5,664	
KASC IC	12,441.936	4,770	15,289	954	3,058	
ASFAN IC	8,031.824	1,958	7,972	392	1,594	
JUNCTIONS (8 Locations)	3,352.520	198	3,130	40	626	
OBHOR INTERCHANGE	2,985.160	0	2,767	0	553	
GORE, ARROWS & STOP LINE		45,318	0	0	0	
TOTAL FOR EACH COLOR		**69,486**	**63,449**	**4,834**	**12,660**	
GRAND TOTAL =	**46,704.258**	**132,935**		**17,494**		

Suprv'g. Consultant : *EUROCONSULT*	*HIGHWAYS TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*	Contractor : *M. A. AL SWAILEM CO.*
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF COMMUNICATIONS	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

FINAL SUMMARY

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White & Yellow Ceramics & Reflective Road Stud*

Item No. : 9030701 & 90308

White & Yellow Ceramics & Reflective Road Stud

9030701 & 90308

GORE, ARROWS & STOP LINE

LOCATION	White Ceramics (pcs)	Yellow Ceramics (pcs)	White Ref. Stud (pcs.)	Yellow Ref. Stud (pcs.)	REMARKS
HARAMAIN ROAD	17,404	0	0	0	
ROAD 1	11,535	0	0	0	
ROAD 2	2,565	0	0	0	
ROAD 3	10,012	0	0	0	
ARROWS & STOP LINE	3,802	0	0	0	
TOTAL	**45,318**	**0**	**0**	0	
GRAND TOTAL =	**45,318**		**0**		

Suprv'g. Consultant :			Contractor:	
EUROCONSULT		*HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*	*M. A. AL SWAILEM CO.*	
Resident Eng'r	Q.S		Pro. Manager	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White Ceramics***

Item Nos. : **9030701**

HARAMAIN ROAD

LOCATIONS	NOSING		CHEVRON			STRIPES			TOTAL	Remarks
	3 Lines Length	TOTAL (0.25 cer. Spacing)	Ave. No. of Cer./chev	No. of Chevron	TOTAL	Ave. No. of Cer./stripe	No. of Stripes	TOTAL	White Ceramics	
HARAMAIN ROAD RIGHT										
HAR. / RAMP B IC#1	80.966	324	60	32	1,920	35	15	525	**2,769**	
HAR. / LOOP B IC#1	14.591	58	45	3	135	0	0	0	**193**	
HAR. / LOOP C IC#1	6.500	26	59	5	293	38	13	494	**813**	
HAR. / RAMP C IC#1	86.345	345	47.500	43	2,043	0	0	0	**2,388**	
HAR. / ACCESS RD.	18.154	73	44	6	264	0	0	0	**337**	
HAR. / RAMP C IC#2	74.019	296	57	11	627	0	0	0	**923**	
HAR. / LOOP C IC#2	12.909	52	44	4	174	0	0	0	**226**	
HAR. / LOOP D IC#2	12.909	52	44	4	174	0	0	0	**226**	
HAR. / RAMP D IC#2	63.010	252	48	8	384	0	0	0	**636**	
HARAMAIN ROAD LEFT										
HAR. / RAMP A IC#2	39.480	158	63	9	567	35	15	518	**1,242**	
HAR. / LOOP A IC#2	13.979	56	47	3	140	0	0	0	**195**	
HAR. / LOOP B IC#2	11.494	46	67	4	266	39	13	507	**819**	
HAR. / RAMP B IC#2	146.435	586	50	14	700	0	0	0	**1,286**	
HAR. / SLIP RAMP1	42.115	168	47	14	651	0	0	0	**819**	
HAR. / SLIP RAMP2	34.000	136	44	20	870	0	0	0	**1,006**	
HAR. / LOOP D IC#1	10.129	41	45	3	135	0	0	0	**176**	
HAR. / LOOP A IC#1	7.320	29	63	4	252	42	12	504	**785**	
HAR. / RAMP A IC#1	85.750	343	57	39	2,223			0	**2,566**	
GRAND TOTAL (WHITE CERAMICS ON HARAMAIN GORES) =									**17,404**	Pcs.

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White Ceramics***

Item Nos. : **9030701**

ROAD 1

LOCATIONS	NOSING		CHEVRON			STRIPES			TOTAL	Remarks
	3 Lines Length	TOTAL (0.25 cer. Spacing)	Ave. No. of Cer./chev	No. of Chevron	TOTAL	Ave. No. of Cer./stripe	No. of Stripes	TOTAL	White Ceramics	
ROAD 1 RIGHT										
RD 1. / RAMP D IC#2	50.729	203	63	8	504	35	15	518	**1,224**	
RD 1. / LOOP D IC#2	16.257	65	48	3	144	0	0	0	**209**	
RD 1. / LOOP A IC#2	18.501	74	74	3	221	42	12	504	**799**	
RD 1. / RAMP A IC#2	100.655	403	49.500	32	1,584	0	0	0	**1,987**	
RD 1. / SLIP RAMP MED.	0.000	0	32	2	63	0	0	0	**63**	
RD 1. / JUNCTION 1D	8.092	32	57	4	228	0	0	0	**260**	
RD 1. / JUNCTION 1A	8.954	36	59	3	176	0	0	0	**211**	
ROAD 1 LEFT										
RD 1. / JUNCTION 1B	16.700	67	65	3	194	0	0	0	**260**	
RD 1. / JUNCTION 1C	8.250	33	62	3	185	0	0	0	**218**	
RD 1. / JUNCTION 8A	628.250	2,513	62	3	185	0	0	0	**2,698**	
RD 1. / SLIP RAMP MED	0.000	0	0	0	0	31	3	92	**92**	
RD 1. / SLIP RAMP RT	0.000	0	0	0	0	44	2	87	**87**	
RD 1. / JUNC'N 8B(OUT)	0.000	0	54	3	162	0	0	0	**162**	
RD 1. / JUNC'N 8B(IN)	0.000	0	66	2	132	0	0	0	**132**	
RD 1. / RAMP B IC#2	63.718	255	54	19	1,026	30	15	450	**1,731**	
RD 1. / LOOP B IC#2	25.467	102	51	3	153	0	0	0	**255**	
RD 1. / LOOP C IC#2	20.966	84	74	3	221	39	13	507	**811**	
RD 1. / RAMP C IC#2	47.944	192	49	3	146	0	0	0	**337**	
GRAND TOTAL (WHITE CERAMICS ON ROAD 1 GORES) =									**11,535**	Pcs.

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White Ceramics***

Item Nos. : **9030701**

ROAD 2

LOCATIONS	NOSING		CHEVRON			STRIPES			TOTAL	Remarks
	3 Lines Length	TOTAL (0.25 cer. Spacing)	Ave. No. of Cer./chev	No. of Chevron	TOTAL	Ave. No. of Cer./stripe	No. of Stripes	TOTAL	White Ceramics	
ROAD 2 RIGHT										
RD 2 / RAMP E	4.826	19	56	3	167	0	0	0	**186**	
RD 2 / RAMP F	4.154	17	62	2	123	0	0	0	**140**	
RD 2 / JUNC'N 7A	0.000	0	34	2	67	0	0	0	**67**	
RD 2 / JUNC'N 7B	0.000	0	32	2	63	0	0	0	**63**	
RD 2 / JUNC'N 6A	3.606	14	53	3	158	0	0	0	**172**	
RD 2 / JUNC'N 6 (OUT)	0.000	0	32	2	63	0	0	0	**63**	
RD 2 / JUNC'N 6 (IN)	0.000	0	41	2	81	0	0	0	**81**	
RD 2 / JUNC'N 5 (OUT)	0.000	0	32	2	63	0	0	0	**63**	
RD 2 / JUNC'N 5 (IN)	0.000	0	41	2	81	0	0	0	**81**	
RD 2 / JUNC'N 4A & C	4.060	16	42	2	84	0	0	0	**100**	
ROAD 2 LEFT										
RD 2 / JUNC'N 4B	3.542	14	33	2	66	0	0	0	**80**	
RD 2 / SLIP RAMP	10.660	43	50	4	198	0	0	0	**241**	
RD 2 / SLIP RAMP(in)	22.504	90	48	12	576	0	0	0	**666**	
RD 2 / SLIP RAMP(out)	19.428	78	33	5	165	0	0	0	**243**	
RD 2 / RAMP G	4.826	19	56	3	167	0	0	0	**186**	
RD 2 / RAMP H	4.157	17	39	3	117	0	0	0	**134**	
GRAND TOTAL (WHITE CERAMICS ON ROAD 2 GORES) =									**2,565**	Pcs.

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White Ceramics*

Item Nos. : 9030701

ROAD 3

LOCATIONS	NOSING		CHEVRON			STRIPES			TOTAL	Remarks
	3 Lines Length	TOTAL (0.25 cer. Spacing)	Ave. No. of Cer./chev	No. of Chevron	TOTAL	Ave. No. of Cer./stripe	No. of Stripes	TOTAL	White Ceramics	
ROAD 3 RIGHT										
RD 3 / RAMP C	51.894	208	62	26	1,599	35	15	518	**2,324**	
RD 3 / LOOP C	8.750	35	42	3	126	0	0	0	**161**	
RD 3 / LOOP D	8.841	35	60	4	240	41	13	527	**802**	
RD 3 / RAMP D	28.300	113	45	7	315	0	0	0	**428**	
RD 3 / JUNC'N 3C	4.108	16	60	2	120	0	0	0	**136**	
RD 3 / JUNC'N 3D	4.108	16	60	2	120	0	0	0	**136**	
RD 3 / JUNC'N 2C	4.108	16	60	2	120	0	0	0	**136**	
RD 3 / JUNC'N 2D	4.108	16	60	2	120	0	0	0	**136**	
RD 3 / JUNC'N 2C/CEN	0.000	0	32	2	63	0	0	0	**63**	
RD 3 / JUNC'N 2D/CEN	0.000	0	59	2	117	0	0	0	**117**	
RD 3 / JUNC'N 1C	7.174	29	71	3	212	0	0	0	**240**	
RD 3 / JUNC'N 1D	16.298	65	59	3	176	0	0	0	**241**	
ROAD 3 LEFT										
RD 3 / JUNC'N 1A	7.868	31	69	3	207	0	0	0	**238**	
RD 3 / JUNC'N 1B	8.729	35	108	4	432	0	0	0	**467**	
RD 3 / RAMP A	41.144	165	63	10	630	35	15	518	**1,312**	
RD 3 / LOOP A	14.250	57	51	3	153	0	0	0	**210**	
RD 3 / LOOP B	14.586	58	60	4	240	0	0	0	**298**	
RD 3 / RAMP B	141.183	565	47	43	2,000	0	0	0	**2,564**	
GRAND TOTAL (WHITE CERAMICS ON ROAD 3 GORES) =									**10,012**	Pcs.

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White Ceramics***

Item Nos. : **9030701**

LOCATIONS	ARROWS STRAIGHT		CURVED ARROWS		STOP LINE			TOTAL	Remarks
	NO. OF ARROWS	TOTAL (40cer./arrow))	NO. OF ARROWS	TOTAL (43cer./arrow))	Lines Length	No. of Lines	TOTAL (0.39 cer. Spacing)	White Ceramics	
HAR. ROAD									
LEFT SIDE	0	0	4	172	0.000	0	0	**172**	
RIGHT SIDE	0	0	4	172	0.000	0	0	**172**	
ROAD 1									
LEFT SIDE	8	320	2	86	18.765	4	191	**597**	
RIGHT SIDE	8	320	2	86	18.837	4	192	**598**	
ROAD 3									
LEFT SIDE	8	320	2	86	35.454	4	361	**767**	
RIGHT SIDE	9	360	3	129	35.599	4	362	**851**	
INTERCHANGE 1									
RAMP A	0	0	2	86	0.000	0	0	**86**	
RAMP B	0	0	3	129	0.000	0	0	**129**	
RAMP C	0	0	2	86	0.000	0	0	**86**	
INTERCHANGE 2									
RAMP A	0	0	2	86	0.000	0	0	**86**	
RAMP B	0	0	2	86	0.000	0	0	**86**	
RAMP C	0	0	2	86	0.000	0	0	**86**	
RAMP D	0	0	2	86	0.000	0	0	**86**	
GRAND TOTAL (WHITE CERAMICS ON ARROWS & STOP LINES) =								**3,802**	Pcs.

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

PLAN ON GORE AREA & STOP LINE

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*** Page: __1_ of __1__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Suprv'g. Consultant : ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF COMMUNICATIONS	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

FINAL SUMMARY

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White & Yellow Ceramics & Reflective Road Stud***

Item No. : **9030701 & 90308**

White & Yellow Ceramics & Reflective Road Stud

9030701 & 90308

HARAMAIN ROAD

LOCATION	White Ceramics (pcs)	Yellow Ceramics (pcs)	White Ref. Stud (pcs.)	Yellow Ref. Stud (pcs.)	REMARKS
Haramain Road	1,445	5,891	289	**1,165**	
TOTAL	**1,445**	**5,891**	**289**	**1,165**	
GRAND TOTAL =	**7,336**		**1,455**		

Suprv'g. Consultant :			Contractor:	
EUROCONSULT		***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***	***M. A. AL SWAILEM CO.***	
Resident Eng'r	Q.S		Pro. Manager	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White & Yellow Ceramics & Reflective Road Stud*

Item Nos. : 9030701 & 90308

HARAMAIN ROAD

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
LEFT SIDE											
1	104+500.000	105+575.000	1075.000	597	597	1,194	119	119	239	M2 & M3	6A
2	105+575.000	105+836.652	261.652	0	145	145	0	29	29	M2 & M3	10/2
3	106+150.000	106+270.000	120.000	0	133	133	0	27	27	M2 & M3	10
4	106+245.000	106+272.000	27.000	0	15	15	0	3	3	M2 & M3	10/2
5	106+272.000	106+650.000	378.000	105	430	535	21	84	105	M2, M3&M5	4A
6	106+650.000	106+675.000	25.000	0	14	14	0	3	3	M2 & M3	10/2
7	107+115.000	107+343.000	228.000	63	260	323	13	51	63	M2 & M3	4A
8	108+890.000	108+995.000	105.000	0	117	117	0	23	23	M2 & M3	10
9	108+995.000	109+440.000	445.000								
10	109+520.000	109+665.000	145.000	0	161	161	0	32	32	M2 & M3	10
11	109+520.000	110+320.000	800.000								
12	110+320.000	110+440.000	120.000	0	133	133	0	27	27	M2 & M3	10
13	110+440.000	110+875.000	435.000	121	495	616	24	97	121	M2, M3&M5	4A
14	110+875.000	110+900.000	25.000	0	14	14	0	3	3	M2 & M3	10/2
15	111+170.000	111+265.000	95.000	0	106	106	0	21	21	M2 & M3	10
16	111+265.000	111+370.000	105.000	0	58	58	0	12	12	M2 & M3	10/2
17	111+370.000	111+810.000	440.000								
18	111+810.000	111+900.000	90.000								
		TOTAL =		886	2,679	3,566	177	530	707		
RIGHT SIDE											
1	105+236.139	105+625.000	388.861	216	216	432	43	43	86	M2 & M3	6A
2	105+625.000	105+860.000	235.000	0	131	131	0	26	26	M2 & M3	10/2
3	105+860.000	105+955.000	95.000	0	106	106	0	21	21	M2 & M3	10
4	105+955.000	106+275.000	320.000								
5	106+275.000	106+300.000	25.000	0	14	14	0	3	3	M2 & M3	10/2
6	106+300.000	106+715.000	415.000	115	473	588	23	92	115	M2, M3&M5	4A
7	106+715.000	106+740.000	25.000	0	14	14	0	3	3	M2 & M3	10/2
8	106+740.000	106+835.000	95.000	0	106	106	0	21	21	M2 & M3	10
9	107+400.000	107+660.000	260.000	0	144	144	0	29	29	M2 & M3	10/2
10	107+660.000	108+375.000	715.000	0	794	794	0	159	159	M2 & M3	10
11	109+235.000	109+280.000	45.000	0	25	25	0	5	5	M2 & M3	10/2
12	109+280.000	109+730.000	450.000	125	512	637	25	100	125	M2, M3&M5	4A
13	109+730.000	109+830.000	100.000	0	56	56	0	11	11	M2 & M3	10/2
14	110+445.000	110+475.000	30.000	0	17	17	0	3	3	M2 & M3	10/2
15	110+475.000	110+845.000	370.000	103	421	524	21	82	103	M2, M3&M5	4A
16	110+845.000	110+875.000	30.000	0	17	17	0	3	3	M2 & M3	10/2
17	110+875.000	110+975.000	100.000	0	111	111	0	22	22	M2 & M3	10
18	111+200.000	111+300.000	100.000	0	56	56	0	11	11	M2 & M3	10/2
		TOTAL =		559	3,211	3,771	112	635	747		
GRAND TOTAL =				1,445	5,891	**7,336**	289	1,165	**1,455**		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __4_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 4A

2 - LANES ROAD WITH ACCELERATION & DECELERATION

TWO CONTINEOUS YELLOW & ONE BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 X 1 + 21 = 41 pcs. WHITE =10 x 1= 10 pcs.	YELLOW =41/36 = 1.139 pc / m WHITE = 10/36 = 0.278 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 + 4=8 WHITE =2 x 1= 2	YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/ 36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __6_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 6A

2 - LANES ROAD

ONE CONTINEOUS YELLOW & TWO BROKEN WHITE

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 X 1=20 pcs. WHITE =10 x 2 = 20 pcs.	YELLOW =20/36 = 0.556 pc / m WHITE = 20/36 = 0.556 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 1 = 4 WHITE =2 x 2 = 4	YELLOW =4 / 36 = 0.11111 pc / m WHITE = 4 / 36 = 0.11111 pc / m TOTAL = 0.2222 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant : ***EUROCONSULT***	**THE KINGDOM OF SAUDI ARABIA** **MINISTRY OF COMMUNICATIONS** **GENERAL TECHNICAL ADMINISTRATION**	Contractor : ***M. A. AL SWAILEM CO.***

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH*** Page: __10_ of __12__

Item Description : ***WHITE , YELLOW ROAD MARKINGCERAMICS & ROAD STUDS*** Drwg. No. _____

Item No. : ***90308 & 9030701***

DETAIL 10

1 - LANE ROAD

TWO CONTINEOUS YELLOW

NUMBER OF TRAFFIC MARKING FOR 36m. LENGTH	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 20 x 2 = 40 pcs.	YELLOW = 40/36 = 1.111 pc / m
NO. OF REF. STUD FOR 36m. LENGTH	**NO. OF REF. STUD FOR ONE LENGTH**
YELLOW = 4 x 2 = 8	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.

Suprv'g. Consultant : ***EUROCONSULT***	**HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS**	Contractor: ***M. A. AL SWAILEM CO.***
Res. Engineer Q.S		Proj. Manager Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF COMMUNICATIONS	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

FINAL SUMMARY

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White & Yellow Ceramics & Reflective Road Stud***

Item No. : **9030701 & 90308**

White & Yellow Ceramics & Reflective Road Stud

9030701 & 90308

JUNCTIONS

LOCATION	White Ceramics (pcs)	Yellow Ceramics (pcs)	White Ref. Stud (pcs.)	Yellow Ref. Stud (pcs.)	REMARKS
JUNCTION 1	0	839	0	168	
JUNCTION 2	0	518	0	104	
JUNCTION 3	66	264	13	53	
JUNCTION 4	132	528	26	106	
JUNCTION 5	0	312	0	62	
JUNCTION 6	0	294	0	59	
JUNCTION 7	0	155	0	31	
JUNCTION 8	0	219	0	44	
TOTAL	**198**	**3,130**	**40**	**626**	
GRAND TOTAL =	**3,328**		**666**		

Suprv'g. Consultant :			Contractor:	
EUROCONSULT		***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***	***M. A. AL SWAILEM CO.***	
Resident Eng'r	Q.S		Pro. Manager	Q.S

Suprv'g. Consultant : EUROCONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORTATION GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

COMPUTATION OF FINAL QUANTITIES

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White & Yellow Ceramics & Reflective Road Stud*

Item Nos. : 9030701 & 90308

JUNCTIONS

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
JUNCTION 1											
1A	0+005.000	0+270.000	265.000	0	294	294	0	59	59	M2	10
1B	0+060.000	0+215.000	155.000	0	172	172	0	34	34	M2	10
1C	0+015.000	0+120.000	105.000	0	117	117	0	23	23	M2	10
1D	0+075.000	0+305.000	230.000	0	256	256	0	51	51	M2	10
		TOTAL =		0	839	839	0	168	168		
JUNCTION 2											
2A	0+030.000	0+080.000	50.000							M2	10
2B	0+045.000	0+090.000	45.000							M2	10
2C	0+000.000	0+080.000	80.000	0	178	178	0	36	36	M2	10X2
2D	0+075.000	0+120.000	45.000	0	50	50	0	10	10	M2	10
2E	0+045.000	0+090.000	45.000	0	50	50	0	10	10	M2	10
2F	0+000.000	0+108.000	108.000	0	240	240	0	48	48	M2	10X2
		TOTAL =		0	518	518	0	104	104		
JUNCTION 3											
3A	0+000.000	0+098.000	98.000							M2 & M3	1
3B	0+000.000	0+098.000	98.000							M2 & M3	1
3D	0+000.000	0+118.000	118.000	33	131	164	7	26	33	M2 & M3	1
3E	0+000.000	0+120.000	120.000	33	133	167	7	27	33	M2 & M3	1
		TOTAL =		66	264	331	13	53	66		
JUNCTION 4											
4A	0+090.000	0+250.000	160.000	44	178	222	9	36	44	M2 & M3	1
4B	0+000.000	0+165.000	165.000	46	183	229	9	37	46	M2 & M3	1
4C	0+090.000	0+240.000	150.000	42	167	208	8	33	42	M2 & M3	1
		TOTAL =		132	528	660	26	106	132		
JUNCTION 5											
5A	0+025.000	0+070.000	45.000	0	50	50	0	10	10	M2	10
5B	0+010.000	0+060.000	50.000	0	56	56	0	11	11	M2	10
5C	0+000.000	0+093.000	93.000	0	207	207	0	41	41	M2	10X2
		TOTAL =		0	312	312	0	62	62		
JUNCTION 6											
6A	0+025.000	0+075.000	50.000	0	56	56	0	11	11	M2	10
6B	0+010.000	0+055.000	45.000	0	50	50	0	10	10	M2	10
6C	0+000.000	0+085.000	85.000	0	189	189	0	38	38	M2	10X2
		TOTAL =		0	294	294	0	59	59		
JUNCTION 7											
7A	0+010.000	0+063.970	53.970	0	60	60	0	12	12	M2	10
7B	0+000.000	0+085.390	85.390	0	95	95	0	19	19	M2	10
		TOTAL =		0	155	155	0	31	31		
JUNCTION 8											
8A	0+056.298	0+085.000	28.702	0	64	64	0	13	13	M2	10X2
8A	0+160.000	0+225.000	65.000	0	72	72	0	14	14	M2	10
8B	0+025.000	0+100.000	75.000	0	83	83	0	17	17	M2	10
		TOTAL =		0	219	219	0	44	44		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m **D1**	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m **D7**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 20/36 = 0.556 pc / m **D2**	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m **D8**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.3333 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m **D3**	YELLOW = 60/36 = 1.667 pc / m WHITE = 20/36 = 0.556 pc / m **D9**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m **D4**	YELLOW = 40/36 = 1.111 pc / m **D10**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 40/36 = 1.111 pc / m **D5**	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m **D11**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =8/ 36 = 0.22222 pc / m TOTAL = 0.5556 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =40/36 = 1.111 pc / m WHITE = 50/36 = 1.389 pc / m **D6**	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m **D12**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE = 10 / 36 = 0.27778 pc / m TOTAL = 0.5000 pc/m.	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF COMMUNICATIONS	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

FINAL SUMMARY

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White & Yellow Ceramics & Reflective Road Stud***

Item No. : **9030701 & 90308**

White & Yellow Ceramics & Reflective Road Stud

9030701 & 90308

KING ABDULLAH INTERCHANGE 1

LOCATION	White Ceramics (pcs)	Yellow Ceramics (pcs)	White Ref. Stud (pcs.)	Yellow Ref. Stud (pcs.)	REMARKS
RAMP A	312	1,250	62	250	
RAMP B	2,074	5,164	415	1,033	
RAMP C	432	1,708	86	342	
RAMP D	404	1,118	81	224	
RAMP E	302	1,208	60	242	
LOOP A	156	610	31	122	
LOOP B	194	778	39	156	
LOOP C	156	603	31	121	
LOOP D	158	619	32	124	
SR1	179	621	36	124	
SR2	403	1,611	81	322	
TOTAL	**4,770**	**15,289**	**954**	**3,058**	
GRAND TOTAL =	**20,059**		**4,012**		

Suprv'g. Consultant :			Contractor:	
EUROCONSULT		***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***	***M. A. AL SWAILEM CO.***	
Resident Eng'r	Q.S		Pro. Manager	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White & Yellow Ceramics & Reflective Road Stud*

Item Nos. : 9030701 & 90308

KAIC INTERCHANGE 1

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
RAMP A											
1	0+000.000	0+500.000	500.000	139	556	694	28	111	139	M2 & M3	1
2	0+500.000	1+125.000	625.000	174	694	868	35	139	174	M2 & M3	1
		TOTAL =		312	1,250	1,562	62	250	312		
RAMP B											
1	0+390.000	1+420.000	1030.000	572	1,144	1,717	114	229	343	M2 & M3	2
2	0+620.000	1+775.000	1155.000	642	1,925	2,567	128	385	513	M2 & M3	9
3	0+660.000	1+870.000	1210.000	672	1,344	2,017	134	269	403	M2 & M3	2
4	1+125.000	1+500.000	375.000	104	417	521	21	83	104	M2 & M3	1
5	1+500.000	1+800.000	300.000	83	333	417	17	67	83	M2 & M3	1
		TOTAL =		2,074	5,164	7,237	415	1,033	1,447		
RAMP C											
1	0+125.000	0+285.000	160.000	44	178	222	9	36	44	M2 & M3	1
2	0+285.000	0+320.000	35.000	19	58	78	4	12	16	M2 & M3	9
3	0+320.000	0+550.000	230.000	64	256	319	13	51	64	M2 & M3	1
4	0+575.000	1+000.000	425.000	118	472	590	24	94	118	M2 & M3	1
5	1+000.000	1+670.000	670.000	186	744	931	37	149	186	M2 & M3	1
		TOTAL =		432	1,708	2,140	86	342	428		
RAMP D											
1	0+000.000	0+475.000	475.000	132	528	660	26	106	132	M2 & M3	1
2	0+475.000	0+925.000	450.000	250	500	750	50	100	150	M2 & M3	2
3	0+925.000	1+006.000	81.000	22	90	112	4	18	22	M2 & M3	1
		TOTAL =		404	1,118	1,522	81	224	304		
LOOP A											
1	0+000.000	0+062.000	62.000	17	69	86	3	14	17	M2 & M3	1
2	0+062.000	0+090.000	28.000	16	47	62	3	9	12	M2 & M3	9
3	0+090.000	0+535.000	445.000	124	494	618	25	99	124	M2 & M3	1
		TOTAL =		156	610	766	31	122	153		
LOOP B											
1	0+000.000	0+500.000	500.000	139	556	694	28	111	139	M2 & M3	1
2	0+500.000	0+700.000	200.000	56	222	278	11	44	56	M2 & M3	1
		TOTAL =		194	778	972	39	156	194		
LOOP C											
1	0+045.000	0+075.000	30.000	8	33	42	2	7	8	M2 & M3	1
2	0+075.000	0+110.000	35.000	19	58	78	4	12	16	M2 & M3	9
3	0+110.000	0+570.000	460.000	128	511	639	26	102	128	M2 & M3	1
		TOTAL =		156	603	758	31	121	152		
LOOP D											
1	0+040.000	0+063.000	23.000	6	26	32	1	5	6	M2 & M3	1
2	0+063.000	0+087.000	24.000	13	40	53	3	8	11	M2 & M3	9
3	0+087.000	0+585.000	498.000	138	553	692	28	111	138	M2 & M3	1
		TOTAL =		158	619	777	32	124	155		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m **D1**	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m **D7**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 20/36 = 0.556 pc / m **D2**	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m **D8**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.3333 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m **D3**	YELLOW = 60/36 = 1.667 pc / m WHITE = 20/36 = 0.556 pc / m **D9**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m **D4**	YELLOW = 40/36 = 1.111 pc / m **D10**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 40/36 = 1.111 pc / m **D5**	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m **D11**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =8/ 36 = 0.22222 pc / m TOTAL = 0.5556 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =40/36 = 1.111 pc / m WHITE = 50/36 = 1.389 pc / m **D6**	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m **D12**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE = 10 / 36 = 0.27778 pc / m TOTAL = 0.5000 pc/m.	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White & Yellow Ceramics & Reflective Road Stud*

Item Nos. : 9030701 & 90308

KAIC INTERCHANGE 1

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
RAMP E											
1	0+100.000	0+500.000	400.000	111	444	556	22	89	111	M2 & M3	1
2	0+500.000	1+000.000	500.000	139	556	694	28	111	139	M2 & M3	1
3	1+000.000	1+187.000	187.000	52	208	260	10	42	52	M2 & M3	1
		TOTAL =		302	1,208	1,510	60	242	302		
SERVICE ROAD 1											
1	0+000.000	0+090.000	90.000	25	100	125	5	20	25	M2 & M3	1
2	0+090.000	0+175.000	85.000	47	94	142	9	19	28	M2 & M3	2
3	0+175.000	0+558.502	383.502	107	426	533	21	85	107	M2 & M3	1
		TOTAL =		179	621	799	36	124	160		
SERVICE ROAD 2											
1	0+500.000	1+000.000	500.000	139	556	694	28	111	139	M2 & M3	1
2	1+000.000	1+950.000	950.000	264	1,056	1,319	53	211	264	M2 & M3	9
		TOTAL =		403	1,611	2,014	81	322	403		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m **D1**	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m **D7**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 20/36 = 0.556 pc / m **D2**	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m **D8**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.3333 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m **D3**	YELLOW = 60/36 = 1.667 pc / m WHITE = 20/36 = 0.556 pc / m **D9**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m **D4**	YELLOW = 40/36 = 1.111 pc / m **D10**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 40/36 = 1.111 pc / m **D5**	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m **D11**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =8/ 36 = 0.22222 pc / m TOTAL = 0.5556 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =40/36 = 1.111 pc / m WHITE = 50/36 = 1.389 pc / m **D6**	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m **D12**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE = 10 / 36 = 0.27778 pc / m TOTAL = 0.5000 pc/m.	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF COMMUNICATIONS	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

FINAL SUMMARY

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White & Yellow Ceramics & Reflective Road Stud***

Item No. : **9030701 & 90308**

White & Yellow Ceramics & Reflective Road Stud

9030701 & 90308

OBHUR INTERCHANGE 3

LOCATION	White Ceramics (pcs)	Yellow Ceramics (pcs)	White Ref. Stud (pcs.)	Yellow Ref. Stud (pcs.)	REMARKS
RAMP E	0	700	0	140	
RAMP F	0	539	0	108	
RAMP G	0	817	0	163	
RAMP H	0	711	0	142	
TOTAL	**0**	**2,767**	**0**	553	
GRAND TOTAL =	**2,767**		**553**		

Suprv'g. Consultant :			Contractor:	
EUROCONSULT		***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***	***M. A. AL SWAILEM CO.***	
Resident Eng'r	Q.S		Pro. Manager	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White & Yellow Ceramics & Reflective Road Stud*

Item Nos. : 9030701 & 90308

OBHUR INTERCHANGE

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
RAMP E											
1	0+000.000	0+630.000	630.000	0	700	700	0	140	140	M2	10
		TOTAL =		0	700	700	0	140	140		
RAMP F											
1	0+110.000	0+595.000	485.000	0	539	539	0	108	108	M2	10
		TOTAL =		0	539	539	0	108	108		
RAMP G											
1	0+040.000	0+775.000	735.000	0	817	817	0	163	163	M2	10
		TOTAL =		0	817	817	0	163	163		
RAMP H											
1	0+050.000	0+690.000	640.000	0	711	711	0	142	142	M2	10
		TOTAL =		0	711	711	0	142	142		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r / Q.S		Proj. Manager / Q.S

UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m **D1**	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m **D7**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 20/36 = 0.556 pc / m **D2**	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m **D8**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.3333 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m **D3**	YELLOW = 60/36 = 1.667 pc / m WHITE = 20/36 = 0.556 pc / m **D9**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m **D4**	YELLOW = 40/36 = 1.111 pc / m **D10**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 40/36 = 1.111 pc / m **D5**	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m **D11**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =8/ 36 = 0.22222 pc / m TOTAL = 0.5556 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =40/36 = 1.111 pc / m WHITE = 50/36 = 1.389 pc / m **D6**	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m **D12**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE = 10 / 36 = 0.27778 pc / m TOTAL = 0.5000 pc/m.	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF COMMUNICATIONS	*M. A. AL SWAILEM CO.*
	GENERAL TECHNICAL ADMINISTRATION	

FINAL SUMMARY

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

Item Description : *White & Yellow Ceramics & Reflective Road Stud*

Item No. : 9030701 & 90308

White & Yellow Ceramics & Reflective Road Stud

9030701 & 90308

ROADS 1, 2 & 3

LOCATION	White Ceramics (pcs)	Yellow Ceramics (pcs)	White Ref. Stud (pcs.)	Yellow Ref. Stud (pcs.)	REMARKS
ROAD 1	7,283	13,156	1,457	**2,622**	
ROAD 2	3,564	5,528	713	1,106	
ROAD 3	4,949	9,717	990	1,937	
TOTAL	**15,797**	**28,400**	**3,159**	**5,664**	
GRAND TOTAL =	**44,197**		**8,824**		

Suprv'g. Consultant :		HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor:	
EUROCONSULT			*M. A. AL SWAILEM CO.*	
Resident Eng'r	Q.S		Pro. Manager	Q.S

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White & Yellow Ceramics & Reflective Road Stud***

Item Nos. : **9030701 & 90308**

ROAD 1

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
LEFT SIDE											
1	0+000.000	0+520.000	520.000	578	578	1,156	116	116	231	M2 & M3	7
2	0+520.000	0+910.000	390.000	217	433	650	43	87	130	M2 & M3	2
3	0+910.000	1+005.000	95.000	53	158	211	11	32	42	M2 & M3	9
4	1+005.000	1+025.000	20.000	11	22	33	2	4	7	M2 & M3	2
5	1+025.000	1+420.000	395.000	329	669	998	66	132	197	M2, M3&M5	4
6	1+420.000	1+775.000	355.000	197	394	592	39	79	118	M2 & M3	2
7	1+775.000	1+870.000	95.000	53	158	211	11	32	42	M2 & M3	9
8	1+870.000	1+995.000	125.000	69	139	208	14	28	42	M2 & M3	2
9	1+995.000	2+120.000	125.000	104	212	316	21	42	62	M2, M3&M5	4
10	2+120.000	2+760.000	640.000	533	711	1,244	107	142	249	M2 & M3	3
11	2+760.000	3+970.000	1210.000	672	1,344	2,017	134	269	403	M2 & M3	2
12	3+970.000	4+075.000	105.000	87	178	265	17	35	52	M2, M3&M5	4
13	4+075.000	4+525.000	450.000	250	500	750	50	100	150	M2 & M3	2
14	4+525.000	4+720.000	195.000	162	330	493	32	65	97	M2, M3&M5	4
15	4+720.000	4+870.000	150.000	83	167	250	17	33	50	M2 & M3	2
16	4+870.000	5+045.000	175.000	146	297	442	29	58	87	M2, M3&M5	4
17	5+045.000	5+125.000	80.000	44	89	133	9	18	27	M2 & M3	2
18	5+180.000	5+300.000	120.000	100	203	303	20	40	60	M2, M3&M5	4
19	5+300.000	5+325.000	25.000	14	28	42	3	6	8	M2 & M3	2
				3,704	6,612	10,316	741	1,316	2,057		
RIGHT SIDE											
1	0+000.000	0+580.000	580.000	644	644	1,289	129	129	258	M2 & M3	7
2	0+580.000	0+665.000	85.000	47	94	142	9	19	28	M2 & M3	2
3	0+665.000	0+765.000	100.000	56	167	222	11	33	44	M2 & M3	9
4	0+765.000	1+030.000	265.000	147	294	442	29	59	88	M2 & M3	2
5	1+030.000	1+440.000	410.000	342	695	1,036	68	137	205	M2, M3&M5	4
6	1+440.000	1+470.000	30.000	17	33	50	3	7	10	M2 & M3	2
7	1+470.000	1+570.000	100.000	56	167	222	11	33	44	M2 & M3	9
8	1+570.000	2+075.000	505.000	281	561	842	56	112	168	M2 & M3	2
9	2+075.000	2+260.000	185.000	154	313	468	31	62	92	M2, M3&M5	4
10	2+260.000	2+850.000	590.000	492	656	1,147	98	131	229	M2 & M3	3
11	2+850.000	4+100.000	1250.000	694	1,389	2,083	139	278	417	M2 & M4	2
12	4+100.000	4+250.000	150.000	83	250	333	17	50	67	M2 & M3	9
13	4+250.000	4+900.000	650.000	361	722	1,083	72	144	217	M2 & M4	2
14	4+900.000	5+050.000	150.000	83	250	333	17	50	67	M2 & M3	9
15	5+050.000	5+125.000	75.000	42	83	125	8	17	25	M2 & M3	2
16	5+180.000	5+210.000	30.000	17	33	50	3	7	10	M2 & M3	2
17	5+210.000	5+325.000	115.000	64	192	256	13	38	51	M2 & M3	9
				3,579	6,544	10,123	716	1,306	2,021		
GRAND TOTAL =				7,283	13,156	**20,439**	1,457	2,622	**4,078**		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r Q.S		Proj. Manager Q.S

UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m **D1**	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m **D7**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 20/36 = 0.556 pc / m **D2**	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m **D8**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.3333 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m **D3**	YELLOW = 60/36 = 1.667 pc / m WHITE = 20/36 = 0.556 pc / m **D9**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m **D4**	YELLOW = 40/36 = 1.111 pc / m **D10**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 40/36 = 1.111 pc / m **D5**	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m **D11**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =8/ 36 = 0.22222 pc / m TOTAL = 0.5556 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =40/36 = 1.111 pc / m WHITE = 50/36 = 1.389 pc / m **D6**	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m **D12**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE = 10 / 36 = 0.27778 pc / m TOTAL = 0.5000 pc/m.	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White & Yellow Ceramics & Reflective Road Stud***

Item Nos. : **9030701 & 90308**

ROAD 2

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
LEFT SIDE											
1	1+000.000	1+120.000	120.000	133	133	267	27	27	53	M2 & M3	7
2	1+120.000	1+150.000	30.000	25	50	75	5	10	15	M2 & M3	8
3	1+150.000	1+305.000	155.000	129	172	301	26	34	60	M2 & M3	3
4	1+305.000	1+710.000	405.000	337	675	1,012	67	135	202	M2 & M3	8
5	1+710.000	2+825.000	1115.000	929	1,239	2,168	186	248	434	M2 & M4	3
6	2+825.000	2+950.000	125.000	104	208	312	21	42	62	M2 & M3	8
7	2+950.000	3+100.000	150.000	125	167	292	25	33	58	M2 & M3	3
				1,783	2,644	4,428	357	529	886		
RIGHT SIDE											
1	1+000.000	1+110.000	110.000	122	122	244	24	24	49	M2 & M3	7
2	1+110.000	1+135.000	25.000	21	42	62	4	8	12	M2 & M3	8
3	1+135.000	1+300.000	165.000	137	183	321	27	37	64	M2 & M3	3
4	1+300.000	1+455.000	155.000	129	258	387	26	52	77	M2 & M3	8
5	1+455.000	1+530.000	75.000	62	83	146	12	17	29	M2 & M3	3
6	1+530.000	1+830.000	300.000	250	500	750	50	100	150	M2 & M3	8
7	1+830.000	1+925.000	95.000	79	106	185	16	21	26	M2 & M3	3
8	1+925.000	2+340.000	415.000	346	692	1,037	69	138	207	M2 & M3	8
9	2+340.000	2+430.000	90.000	75	100	175	15	20	35	M2 & M3	3
10	2+430.000	2+525.000	95.000	79	158	237	16	32	47	M2 & M3	8
11	2+525.000	3+100.000	575.000	479	639	1,118	96	128	224	M2 & M3	3
				1,781	2,883	4,664	356	577	922		
GRAND TOTAL =				3,564	5,528	**9,092**	713	1,106	**1,808**		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r Q.S		Proj. Manager Q.S

UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m **D1**	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m **D7**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 20/36 = 0.556 pc / m **D2**	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m **D8**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.3333 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m **D3**	YELLOW = 60/36 = 1.667 pc / m WHITE = 20/36 = 0.556 pc / m **D9**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m **D4**	YELLOW = 40/36 = 1.111 pc / m **D10**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 40/36 = 1.111 pc / m **D5**	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m **D11**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =8/ 36 = 0.22222 pc / m TOTAL = 0.5556 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =40/36 = 1.111 pc / m WHITE = 50/36 = 1.389 pc / m **D6**	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m **D12**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE = 10 / 36 = 0.27778 pc / m TOTAL = 0.5000 pc/m.	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
EUROCONSULT	MINISTRY OF TRANSPORTATION	***M. A. AL SWAILEM CO.***
	GENERAL TECHNICAL ADMINISTRATION	

COMPUTATION OF FINAL QUANTITIES

Project : ***HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS***

Item Description : ***White & Yellow Ceramics & Reflective Road Stud***

Item Nos. : **9030701 & 90308**

ROAD 3

SER. NO.	Station		Length	Road CERAMICS			Road Studs			Remarks	
	From	To	M	White	Yellow	PCS.	White	Yellow	PCS.	TYPE	Details
LEFT SIDE											
1	1+500.000	1+600.000	100.000	56	111	167	11	22	33	M2 & M3	2
2	1+600.000	1+700.000	100.000	56	111	167	11	22	33	M2 & M3	2
3	1+700.000	1+800.000	100.000	56	111	167	11	22	33	M2 & M3	2
4	1+800.000	1+900.000	100.000	56	111	167	11	22	33	M2 & M3	2
5	1+900.000	2+050.000	150.000	83	167	250	17	33	50	M2 & M3	2
6	2+050.000	2+132.000	82.000								
7	2+132.000	2+720.000	588.000	490	996	1,486	98	196	294	M2, M3&M5	4
8	2+720.000	2+930.000	210.000	117	233	350	23	47	70	M2 & M3	2
9	2+930.000	3+025.000	95.000	53	158	211	11	32	42	M2 & M3	9
10	3+025.000	3+125.000	100.000	56	111	167	11	22	33	M2 & M3	2
11	3+125.000	3+340.000	215.000	179	358	537	36	72	107	M2 & M3	8
12	3+340.000	3+425.000	85.000	71	94	165	14	19	33	M2 & M3	3
13	3+425.000	3+865.000	440.000	367	733	1,100	73	147	220	M2 & M3	8
14	3+940.000	3+965.000	25.000	21	28	49	4	6	10	M2 & M3	3
15	3+965.000	4+425.000	460.000	383	767	1,150	77	153	230	M2 & M3	8
16	4+425.000	4+510.000	85.000	71	94	165	14	19	33	M2 & M3	3
17	4+565.000	4+800.000	235.000	196	392	587	39	78	117	M2 & M3	8
18	4+800.000	5+000.000	200.000	167	222	389	33	44	78	M2 & M3	3
				2,475	4,799	7,274	495	957	1,451		
RIGHT SIDE											
1	1+500.000	1+525.000	25.000	14	42	56	3	8	11	M2 & M3	9
2	1+525.000	1+575.000	50.000	28	83	111	6	17	22	M2 & M3	9
3	1+575.000	1+590.000	15.000	8	25	33	2	5	7	M2 & M3	9
4	1+590.000	1+750.000	160.000	89	178	267	18	36	53	M2 & M3	2
5	1+750.000	1+850.000	100.000	56	167	222	11	33	44	M2 & M3	9
6	1+850.000	2+050.000	200.000	111	222	333	22	44	67	M2 & M3	2
7	2+132.000	2+690.000	558.000	465	945	1,410	93	186	279	M2, M3&M5	4
8	2+690.000	2+720.000	30.000	17	33	50	3	7	10	M2 & M3	2
9	2+720.000	2+820.000	100.000	56	167	222	11	33	44	M2 & M3	9
10	2+820.000	3+125.000	305.000	169	339	508	34	68	102	M2 & M3	2
11	3+125.000	3+340.000	215.000	179	358	537	36	72	107	M2 & M3	8
12	3+340.000	3+425.000	85.000	71	94	165	14	19	33	M2 & M3	3
13	3+425.000	3+865.000	440.000	367	733	1,100	73	147	220	M2 & M3	8
14	3+940.000	3+955.000	15.000	12	17	29	2	3	6	M2 & M3	3
15	3+955.000	4+510.000	555.000	462	925	1,387	92	185	277	M2 & M3	8
16	4+555.000	4+630.000	75.000	62	83	146	12	17	29	M2 & M3	3
17	4+630.000	4+800.000	170.000	142	283	425	28	57	85	M2 & M3	8
18	4+800.000	5+000.000	200.000	167	222	389	33	44	78	M2 & M3	3
				2,475	4,918	7,392	495	980	1,475		
GRAND TOTAL =				4,949	9,717	**14,666**	990	1,937	**2,927**		

Consultant: EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor M. A. AL SWAILEM CO.
Resident Eng'r Q.S		Proj. Manager Q.S

UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 10/36 = 0.278 pc / m **D1**	YELLOW =40/36 = 1.111 pc / m WHITE = 40/36 = 1.111 pc / m **D7**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.2778 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m WHITE = 8 / 36 = 0.22222 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 20/36 = 0.556 pc / m **D2**	YELLOW =60/36 = 1.667 pc / m WHITE = 30/36 = 0.833 pc / m **D8**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.3333 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.5000 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW = 40/36 = 1.111 pc / m WHITE = 30/36 = 0.833 pc / m **D3**	YELLOW = 60/36 = 1.667 pc / m WHITE = 20/36 = 0.556 pc / m **D9**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE =6/ 36 = 0.16667 pc / m TOTAL = 0.3889 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =4/ 36 = 0.11111 pc / m TOTAL = 0.4444 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 30/36 = 0.833 pc / m **D4**	YELLOW = 40/36 = 1.111 pc / m **D10**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =6/ 36 = 0.16666 pc / m TOTAL = 0.5000 pc/m.	YELLOW =8 / 36 = 0.22222 pc / m TOTAL = 0.2222 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =61/36 = 1.694 pc / m WHITE = 40/36 = 1.111 pc / m **D5**	YELLOW = 60/36 = 1.667 pc / m WHITE = 10/36 = 0.278 pc / m **D11**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =12 / 36 = 0.33333 pc / m WHITE =8/ 36 = 0.22222 pc / m TOTAL = 0.5556 pc/m.	YELLOW =12 / 36 = 0.33333 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.3889 pc/m.
UMBER OF TRAFFIC MARKING FOR ONE LENG	NUMBER OF TRAFFIC MARKING FOR ONE LENGTH
YELLOW =40/36 = 1.111 pc / m WHITE = 50/36 = 1.389 pc / m **D6**	YELLOW = 80/36 = 2.222 pc / m WHITE = 10/36 = 0.278 pc / m **D12**
NO. OF REF. STUD FOR ONE LENGTH	NO. OF REF. STUD FOR ONE LENGTH
YELLOW =8 / 36 = 0.22222 pc / m WHITE = 10 / 36 = 0.27778 pc / m TOTAL = 0.5000 pc/m.	YELLOW =16 / 36 = 0.44444 pc / m WHITE =2/36 = 0.05556 pc / m TOTAL = 0.5000 pc/m.

FRONT VIEW
N.T.S.

SIDE VIEW
N.T.S.

PIPE	Bot. Piece	Top Piece	Total Length
	1.450	2.836	4.286

			PIPE	
Points	1	2	3	4
Distance	0.000	3.000	5.450	6.520
Elevation	690.179	690.134	689.522	689.254

Notes:

1 - FOR DETAILS OF BREAKAWAY INCLINED SLIP BASE, SIGN PANEL, & OTHERS. REFER TO M.O.T. TRAFFIC ENGINEERING SAFETY DEPARTMENT'S STANDARD SPECIFICATIOS, ETC.
2 - PRIOR TO FABRICATION OF MATERIALS, SAMPLES FROM THE APPROVED MANUFACTURER SHALL BE REQUIRED FOR TESTING & APPROVAL BY THE M.O.T.
3 - CONCRETE SHALL BE K210.
4 - DIAMOND GRADE FOR ALL HIGHWAY STANDARD.

MOHD. A. AL SWAILEM CO.
CONTRACTOR

ITAL CONSULT
CONSULTANT

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
اداره الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

PROJECT:
DOUBLING TAIF AL BAHA - ABHA ROAD

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

TITLE:
STA. 35 + 000.000
HIGHWAY STANDARD SIGN

A : APPROVED
B : Approved w/ Corrections
C : REVISE & RESUBMIT
D : Resubmit not Reviewed

Drwng No.	Submitted By:	Checked By:	Approved By:

FRONT VIEW
N.T.S.

SIDE VIEW
N.T.S.

	Bot. Piece	Top Piece	Total Length
PIPE	1.200	3.248	4.448

			PIPE	
Points	1	2	3	4
Distance	0.000	3.000	5.550	6.520
Elevation	690.179	690.134	689.284	688.961

Notes:

1 - FOR DETAILS OF BREAKAWAY INCLINED SLIP BASE, SIGN PANEL, & OTHERS. REFER TO M.O.T. TRAFFIC ENGINEERING SAFETY DEPARTMENT'S STANDARD SPECIFICATIOS, ETC.
2 - PRIOR TO FABRICATION OF MATERIALS, SAMPLES FROM THE APPROVED MANUFACTURER SHALL BE REQUIRED FOR TESTING & APPROVAL BY THE M.O.T.
3 - CONCRETE SHALL BE K210.
4 - DIAMOND GRADE FOR ALL HIGHWAY STANDARD.

MOHD. A. AL SWAILEM CO.
CONTRACTOR

ITAL CONSULT
CONSULTANT

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
اداره الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

PROJECT:
DOUBLING TAIF AL BAHA - ABHA ROAD

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

TITLE:
STA. 35 + 000.000
HIGHWAY STANDARD
SIGN

A : APPROVED
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D : Resubmit not Reviewed

Drwng No.	Submitted By:	Checked By:	Approved By:

SIGN NO. _____

FRONT VIEW
N.T.S.

SIDE VIEW
N.T.S.

Notes:

1.) THE SIZE OF FOOTING AND IPE POSTS ARE OBTAINED FROM M.O.T. STD.
2.) High Intensity for all background
3.) Diamond Grade for all writing and Logos

IPE SIZE = 300

Post	Bot. Piece	Top Piece	Total Length
PT1	1.300	7.828	9.128
PT2	1.300	7.949	9.249

			PT1		PT2		
Points	1	2	3	4	5	6	7
Distance	0.000	3.000	8.300	9.500	10.700	13.300	20.000
Elevation	690.179	690.134	689.251	689.051	689.130	689.300	689.128

BOTTOM PIECE DETAIL
N.T.S.

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اداره الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

PROJECT:
DOUBLING TAIF AL BAHA - ABHA ROAD

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

TITLE:
STA. 35 + 000.000
HIGHWAY SIGN
DOUBLE POST

A : APPROVED
B : Approved w/ Corrections
C : REVISE & RESUBMIT
D : Resubmit not Reviewed

Drwng No.	Submitted By:	Checked By:	Approved By:

MOHD. A. AL SWAILEM CO.
CONTRACTOR

ITAL CONSULT
CONSULTANT

SIGN NO. _____

Notes:

1.) THE SIZE OF FOOTING AND IPE POSTS ARE OBTAINED FROM M.O.T. STD.
2.) High Intensity for all background
3.) Diamond Grade for all writing and Logos

IPE SIZE = 300

Post	Bot. Piece	Top Piece	Total Length
PT1	1.300	9.199	10.499
PT2	1.300	9.511	10.811
PT3	1.300	9.753	11.053

			PT1		PT2		PT3		
Points	1	2	3	4	5	6	7	8	9
Distance	0.000	3.000	8.125	9.500	10.000	11.750	11.875	13.300	20.000
Elevation	690.179	690.134	689.280	689.051	688.968	688.676	688.726	689.300	689.128

FRONT VIEW
N.T.S.

SIDE VIEW
N.T.S.

BOTTOM PIECE DETAIL
N.T.S.

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
اداره الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

PROJECT:
DOUBLING TAIF AL BAHA - ABHA ROAD

CONTRACTOR:
M. A. AL SWAILEM CO.

CONSULTANT:
ITAL CONSULT

TITLE:
STA. 35 + 000.000
HIGHWAY SIGN
TRIPLE POST

A : APPROVED
B : Approved w/ Corrections
C : REVISE & RESUBMIT
D : Resubmit not Reviewed

Drwng No.	Submitted By:	Checked By:	Approved By:

MOHD. A. AL SWAILEM CO.
CONTRACTOR

ITAL CONSULT
CONSULTANT

IPE & FOOTING SIZES FOR DIRECTIONAL SIGNS

No. of post	IPE speci-fication
Footing width	

TABLE 1 FOR SLOPE 0 : 0 (Flat)

H \ W	Up to 1.00	>1 to 1.50	>1.5 to 2.0	>2.0 to 2.5	>2.5 to 3.0	>3.0 to 3.5	>3.5 to 4.0	>4.0 to 4.5	>4.5 to 5.0	>5.0 to 5.5	>5.5 to 6.0
Up to 1.00	2 IPE 100	2 IPE 100	2 IPE 100	2 IPE 100	2 IPE 120	2 IPE 120	2 IPE 140	3 IPE 120	3 IPE 120	3 IPE 120	3 IPE 140
	0.8	1.0	1.1	1.2	1.3	1.5	1.6	1.3	1.4	1.5	1.6
>1 to 1.50	2 IPE 100	2 IPE 100	2 IPE 120	2 IPE 140	2 IPE 140	2 IPE 160	2 IPE 160	3 IPE 140	3 IPE 160	3 IPE 160	3 IPE 160
	1.0	1.2	1.4	1.6	1.7	1.8	2.0	1.7	1.8	1.9	2.0
>1.5 to 2.0	2 IPE 100	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 160	2 IPE 180	2 IPE 180	3 IPE 160	3 IPE 180	3 IPE 180	3 IPE 180
	1.2	1.4	1.7	1.8	2.0	2.2	2.3	2.0	2.1	2.2	2.3
>2.0 to 2.5	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 180	2 IPE 200	2 IPE 220	3 IPE 180	3 IPE 200	3 IPE 200	3 IPE 220
	1.3	1.6	1.9	2.1	2.3	2.5	2.7	2.3	2.5	2.6	2.7
>2.5 to 3.0	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 200	2 IPE 200	2 IPE 240	3 IPE 200	3 IPE 220	3 IPE 220	3 IPE 240
	1.5	1.8	2.1	2.4	2.6	2.8	3.0	2.6	2.8	2.9	3.0
>3.0 to 3.5	2 IPE 140	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 220	2 IPE 240	2 IPE 240	3 IPE 220	3 IPE 240	3 IPE 240	3 IPE 240
	1.7	2.0	2.4	2.6	2.9	3.1	3.3	2.9	3.1	3.2	3.3
>3.5 to 4.0	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240
	1.8	2.2	2.6	2.9	3.2	3.4	3.7	3.2	3.3	3.5	3.7
>4.0 to 4.5	2 IPE 160	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 300	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 300
	2.0	2.4	2.8	3.1	3.4	3.7	4.0	3.4	3.6	3.8	4.0
>4.5 to 5.0	2 IPE 180	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	3 IPE 240	3 IPE 300	3 IPE 300	3 IPE 300
	2.1	2.6	3.0	3.4	3.7	4.0	4.3	3.7	3.9	4.1	4.3
>5.0 to 5.5	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300
	2.3	2.8	3.2	3.6	4.0	4.3	4.6	4.0	4.2	4.4	4.6
>5.5 to 6.0	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300
	2.4	3.0	3.5	3.9	4.2	4.6	4.9	4.2	4.5	4.7	4.9

W= Width of Sign (m)
H= Height of Sign (m)

Footing height = 1.00m
Footing Length = 0.80m

IPE & FOOTING SIZES FOR DIRECTIONAL SIGNS

No. of post	IPE speci-fication
Footing width	

TABLE 2 FOR SLOPE 2 : 1 (0.50)

H \ W	Up to 1.00	>1 to 1.50	>1.5 to 2.0	>2.0 to 2.5	>2.5 to 3.0	>3.0 to 3.5	>3.5 to 4.0	>4.0 to 4.5	>4.5 to 5.0	>5.0 to 5.5	>5.5 to 6.0
Up to 1.00	2 IPE 100	2 IPE 100	2 IPE 120	2 IPE 140	2 IPE 140	2 IPE 160	2 IPE 180	3 IPE 160	3 IPE 160	3 IPE 180	3 IPE 180
	0.9	1.1	1.3	1.5	1.6	1.8	2.0	1.7	1.9	2.0	2.1
>1 to 1.50	2 IPE 100	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 180	2 IPE 200	3 IPE 180	3 IPE 200	3 IPE 200	3 IPE 220
	1.1	1.4	1.6	1.9	2.1	2.3	2.5	2.2	2.3	2.5	2.6
>1.5 to 2.0	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 220	3 IPE 200	3 IPE 220	3 IPE 240	3 IPE 240
	1.3	1.6	1.9	2.2	2.4	2.7	2.9	2.6	2.7	2.9	3.1
>2.0 to 2.5	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240
	1.5	1.9	2.2	2.5	2.8	3.0	3.3	2.9	3.1	3.3	3.5
>2.5 to 3.0	2 IPE 140	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 300
	1.7	2.1	2.4	2.8	3.1	3.4	3.7	3.2	3.5	3.7	3.9
>3.0 to 3.5	2 IPE 160	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 300	3 IPE 240	3 IPE 300	3 IPE 300	3 IPE 300
	1.8	2.3	2.7	3.1	3.4	3.7	4.0	3.6	3.8	4.0	4.3
>3.5 to 4.0	2 IPE 180	2.5 IPE 200	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300
	2.0	2.5	2.9	3.3	3.7	4.0	4.4	3.9	4.1	4.4	4.6
>4.0 to 4.5	2 IPE 180	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 360
	2.2	2.7	3.2	3.6	4.0	4.4	4.7	4.2	4.4	4.7	5.0
>4.5 to 5.0	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	2 IPE 360	3 IPE 300	3 IPE 300	3 IPE 360	3 IPE 360
	2.3	2.9	3.4	3.8	4.3	4.7	5.1	4.5	4.7	5.0	5.3
>5.0 to 5.5	2 IPE 200	3.1 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	2 IPE 360	3 IPE 300	3 IPE 360	3 IPE 360	3 IPE 400
	2.5	3.1	3.6	4.1	4.6	5.0	5.4	4.7	5.1	5.4	5.7
>5.5 to 6.0	2 IPE 220	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 360	2 IPE 360	2 IPE 400	3 IPE 360	3 IPE 360	3 IPE 400	3 IPE 400
	2.6	3.3	3.8	4.4	4.8	5.3	5.7	5.0	5.3	5.7	6.0

W= Width of Sign (m)
H= Height of Sign (m)

Footing height = 1.00m
Footing Length = 0.80m

IPE & FOOTING SIZES FOR DIRECTIONAL SIGNS

No. of post	IPE speci-fication
Footing width	

TABLE 3 FOR SLOPE 3 : 1 (0.33)

H \ W	Up to 1.00	>1 to 1.50	>1.5 to 2.0	>2.0 to 2.5	>2.5 to 3.0	>3.0 to 3.5	>3.5 to 4.0	>4.0 to 4.5	>4.5 to 5.0	>5.0 to 5.5	>5.5 to 6.0
Up to 1.00	2 IPE 100	2 IPE 100	2 IPE 120	2 IPE 120	2 IPE 140	2 IPE 140	2 IPE 160	3 IPE 140	3 IPE 160	3 IPE 160	3 IPE 160
	0.9	1.1	1.2	1.4	1.6	1.7	1.8	1.6	1.7	1.8	1.9
>1 to 1.50	2 IPE 100	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 160	2 IPE 180	2 IPE 200	3 IPE 180	3 IPE 180	3 IPE 200	3 IPE 200
	1.1	1.3	1.6	1.8	1.9	2.1	2.3	2.0	2.2	2.3	2.4
>1.5 to 2.0	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 200	2 IPE 220	3 IPE 200	3 IPE 200	3 IPE 220	3 IPE 220
	1.3	1.6	1.8	2.1	2.3	2.5	2.7	2.4	2.5	2.7	2.9
>2.0 to 2.5	2 IPE 120	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 220	2 IPE 240	3 IPE 220	3 IPE 220	3 IPE 240	3 IPE 240
	1.4	1.8	2.1	2.4	2.6	2.9	3.1	2.7	2.9	3.1	3.2
>2.5 to 3.0	2 IPE 140	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240
	1.6	2.0	2.3	2.7	2.9	3.2	3.5	3.0	3.2	3.4	3.6
>3.0 to 3.5	2 IPE 160	2 IPE 180	2 IPE 220	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 300
	1.8	2.2	2.6	2.9	3.2	3.5	3.8	3.3	3.6	3.8	4.0
>3.5 to 4.0	2 IPE 160	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	3 IPE 240	3 IPE 300	3 IPE 300	3 IPE 300
	2.0	2.4	2.8	3.2	3.5	3.9	4.2	3.6	3.9	4.1	4.3
>4.0 to 4.5	2 IPE 180	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300
	2.1	2.6	3.1	3.4	3.8	4.2	4.5	3.9	4.2	4.4	4.7
>4.5 to 5.0	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 360
	2.3	2.8	3.3	3.7	4.1	4.5	4.8	4.2	4.5	4.7	5.0
>5.0 to 5.5	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	2 IPE 360	3 IPE 300	3 IPE 300	3 IPE 360	3 IPE 360
	2.4	3.0	3.5	3.9	4.4	4.8	5.1	4.5	4.8	5.1	5.3
>5.5 to 6.0	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 360	2 IPE 360	2 IPE 400	3 IPE 300	3 IPE 360	3 IPE 360	3 IPE 400
	2.6	3.2	3.7	4.2	4.6	5.0	5.4	4.8	5.1	5.4	5.6

W= Width of Sign (m)
H= Height of Sign (m)

Footing height = 1.00m
Footing Length = 0.80m

IPE & FOOTING SIZES FOR DIRECTIONAL SIGNS

No. of post	IPE specification

TABLE 4 FOR SLOPE 4 : 1 (0.25)

H \ W	Up to 1.00	>1 to 1.50	>1.5 to 2.0	>2.0 to 2.5	>2.5 to 3.0	>3.0 to 3.5	>3.5 to 4.0	>4.0 to 4.5	>4.5 to 5.0	>5.0 to 5.5	>5.5 to 6.0
Up to 1.00	2 IPE 100	2 IPE 100	2 IPE 100	2 IPE 120	2 IPE 140	2 IPE 140	2 IPE 160	3 IPE 140	3 IPE 140	3 IPE 160	3 IPE 160
	0.8	1.0	1.2	1.4	1.5	1.6	1.8	1.6	1.7	1.8	1.8
>1 to 1.50	2 IPE 100	2 IPE 120	2 IPE 140	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 180	3 IPE 160	3 IPE 180	3 IPE 180	3 IPE 200
	1.0	1.3	1.5	1.7	1.9	2.1	2.2	2.0	2.1	2.2	2.3
>1.5 to 2.0	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 180	2 IPE 200	2 IPE 220	3 IPE 200	3 IPE 200	3 IPE 200	3 IPE 220
	1.2	1.5	1.8	2.0	2.2	2.4	2.6	2.3	2.5	2.6	2.7
>2.0 to 2.5	2 IPE 120	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 200	2 IPE 220	2 IPE 240	3 IPE 220	3 IPE 220	3 IPE 240	3 IPE 240
	1.4	1.8	2.1	2.3	2.6	2.8	3.0	2.6	2.8	3.0	3.1
>2.5 to 3.0	2 IPE 140	2 IPE 160	2 IPE 200	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240
	1.6	2.0	2.3	2.6	2.9	3.1	3.4	2.9	3.1	3.3	3.5
>3.0 to 3.5	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 300
	1.8	2.2	2.5	2.9	3.2	3.4	3.7	3.2	3.4	3.6	3.8
>3.5 to 4.0	2 IPE 160	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 300	3 IPE 300
	1.9	2.4	2.8	3.1	3.4	3.7	4.0	3.5	3.8	4.0	4.2
>4.0 to 4.5	2 IPE 180	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300
	2.1	2.6	3.0	3.4	3.7	4.1	4.4	3.8	4.1	4.3	4.5
>4.5 to 5.0	2 IPE 180	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 360
	2.2	2.8	3.2	3.6	4.1	4.3	4.7	4.1	4.3	4.6	4.8
>5.0 to 5.5	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	2 IPE 360	3 IPE 300	3 IPE 300	3 IPE 360	3 IPE 360
	2.4	3.0	3.4	3.9	4.3	4.6	5.0	4.4	4.6	4.9	5.1
>5.5 to 6.0	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 360	2 IPE 360	3 IPE 300	3 IPE 360	3 IPE 360	3 IPE 400
	2.5	3.1	3.7	4.1	4.5	4.9	5.3	4.6	4.9	5.2	5.5

W= Width of Sign (m)
H= Height of Sign (m)

Footing height = 1.00m
Footing Length = 0.80m

IPE & FOOTING SIZES FOR DIRECTIONAL SIGNS

No. of post	IPE specification
Footing width	

TABLE 5 FOR SLOPE 5 : 1 (0.20)

H \ W	Up to 1.00	>1 to 1.50	>1.5 to 2.0	>2.0 to 2.5	>2.5 to 3.0	>3.0 to 3.5	>3.5 to 4.0	>4.0 to 4.5	>4.5 to 5.0	>5.0 to 5.5	>5.5 to 6.0
Up to 1.00	2 IPE 100	2 IPE 100	2 IPE 100	2 IPE 120	2 IPE 120	2 IPE 140	2 IPE 140	3 IPE 140	3 IPE 140	3 IPE 140	3 IPE 160
	0.8	1.0	1.2	1.3	1.5	1.6	1.7	1.5	1.6	1.7	1.8
>1 to 1.50	2 IPE 100	2 IPE 120	2 IPE 140	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 180	3 IPE 160	3 IPE 180	3 IPE 180	3 IPE 180
	1.0	1.3	1.5	1.7	1.9	2.0	2.2	1.9	2.0	2.1	2.3
>1.5 to 2.0	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 200	3 IPE 180	3 IPE 200	3 IPE 200	3 IPE 220
	1.2	1.5	1.8	2.0	2.2	2.4	2.6	2.3	2.4	2.5	2.7
>2.0 to 2.5	2 IPE 120	2 IPE 160	2 IPE 180	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 220	3 IPE 200	3 IPE 220	3 IPE 220	3 IPE 240
	1.4	1.7	2.0	2.3	2.5	2.7	2.9	2.6	2.7	2.9	3.0
>2.5 to 3.0	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	3 IPE 220	3 IPE 240	3 IPE 240	3 IPE 240
	1.6	1.9	2.3	2.6	2.8	3.1	3.3	2.9	3.1	3.2	3.4
>3.0 to 3.5	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240
	1.7	2.2	2.5	2.8	3.1	3.4	3.6	3.2	3.4	3.6	3.7
>3.5 to 4.0	2 IPE 160	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 300	3 IPE 240	3 IPE 240	3 IPE 300	3 IPE 300
	1.9	2.4	2.7	3.1	3.4	3.7	4.0	3.5	3.7	3.9	4.1
>4.0 to 4.5	2 IPE 180	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	3 IPE 240	3 IPE 300	3 IPE 300	3 IPE 300
	2.1	2.5	3.0	3.3	3.7	4.0	4.3	3.7	4.0	4.2	4.4
>4.5 to 5.0	2 IPE 180	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300
	2.2	2.7	3.2	3.6	3.9	4.3	4.6	4.0	4.3	4.5	4.7
>5.0 to 5.5	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	2 IPE 360	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 360
	2.4	2.9	3.4	3.8	4.2	4.6	4.9	4.3	4.5	4.8	5.0
>5.5 to 6.0	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 360	2 IPE 360	3 IPE 300	3 IPE 360	3 IPE 360	3 IPE 360
	2.5	3.1	3.6	4.1	4.5	4.9	5.2	4.6	4.8	5.1	5.4

W= Width of Sign (m)
H= Height of Sign (m)

Footing height = 1.00m
Footing Length = 0.80m

IPE & FOOTING SIZES FOR DIRECTIONAL SIGNS

No. of post	IPE speci-fication
Footing width	

TABLE 6 FOR SLOPE 6 : 1 (0.17)

H \ W	Up to 1.00	>1 to 1.50	>1.5 to 2.0	>2.0 to 2.5	>2.5 to 3.0	>3.0 to 3.5	>3.5 to 4.0	>4.0 to 4.5	>4.5 to 5.0	>5.0 to 5.5	>5.5 to 6.0
Up to 1.00	2 IPE 100	2 IPE 100	2 IPE 100	2 IPE 120	2 IPE 120	2 IPE 140	2 IPE 140	3 IPE 140	3 IPE 140	3 IPE 140	3 IPE 160
	0.8	1.0	1.2	1.3	1.5	1.6	1.7	1.5	1.6	1.7	1.8
>1 to 1.50	2 IPE 100	2 IPE 120	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 160	2 IPE 180	3 IPE 160	3 IPE 160	3 IPE 180	3 IPE 180
	1.0	1.3	1.5	1.7	1.8	2.0	2.1	1.9	2.0	2.1	2.2
>1.5 to 2.0	2 IPE 100	2 IPE 140	2 IPE 160	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 200	3 IPE 180	3 IPE 200	3 IPE 200	3 IPE 200
	1.2	1.5	1.7	2.0	2.2	2.4	2.5	2.2	2.3	2.5	2.6
>2.0 to 2.5	2 IPE 120	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 220	3 IPE 200	3 IPE 220	3 IPE 220	3 IPE 240
	1.4	1.7	2.0	2.2	2.5	2.7	2.9	2.5	2.7	2.8	3.0
>2.5 to 3.0	2 IPE 140	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	3 IPE 220	3 IPE 240	3 IPE 240	3 IPE 240
	1.6	1.9	2.2	2.5	2.8	3.0	3.2	2.8	3.0	3.2	3.3
>3.0 to 3.5	2 IPE 160	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 240
	1.7	2.1	2.5	2.8	3.1	3.3	3.6	3.1	3.3	3.5	3.7
>3.5 to 4.0	2 IPE 160	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 240	2 IPE 300	3 IPE 240	3 IPE 240	3 IPE 240	3 IPE 300
	1.9	2.3	2.7	3.0	3.4	3.6	3.9	3.4	3.6	3.8	4.0
>4.0 to 4.5	2 IPE 180	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	3 IPE 240	3 IPE 300	3 IPE 300	3 IPE 300
	2.1	2.5	2.9	3.3	3.6	3.9	4.2	3.7	3.9	4.1	4.3
>4.5 to 5.0	2 IPE 180	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 300
	2.2	2.7	3.2	3.5	3.9	4.2	4.5	4.0	4.2	4.4	4.6
>5.0 to 5.5	2 IPE 200	2 IPE 220	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 360	3 IPE 300	3 IPE 300	3 IPE 300	3 IPE 360
	2.4	2.9	3.4	3.8	4.2	4.5	4.9	4.2	4.5	4.7	5.0
>5.5 to 6.0	2 IPE 200	2 IPE 240	2 IPE 240	2 IPE 300	2 IPE 300	2 IPE 300	2 IPE 360	3 IPE 300	3 IPE 300	3 IPE 360	3 IPE 360
	2.5	3.1	3.6	4.0	4.4	4.8	5.2	4.5	4.8	5.0	5.3

W= Width of Sign (m)
H= Height of Sign (m)

Footing height = 1.00m
Footing Length = 0.80m

IPE SIGN SUPPORT - WEIGHT SHEET

IPE	Length of Post			Total Length	Weight / Length	Total Weight	Weight Of break	Total Wt. Black	Total Wt. Galv.
	Post 1	Post 2	Post 3						
Formulae:	1	2	3	4 =1+2+3	5	6 = 4 x 5	7	8=6+7+7	9=8x(1.03)
80	1.000	0.000	0.000	1.000	6.000	6.000	1.412	8.824	**9.089**
100	1.000	0.000	0.000	1.000	8.100	8.100	1.412	10.924	**11.252**
120	1.000	0.000	0.000	1.000	10.400	10.400	1.412	13.224	**13.621**
140	1.000	0.000	0.000	1.000	12.900	12.900	1.412	15.724	**16.196**
160	1.000	0.000	0.000	1.000	15.800	15.800	1.412	18.624	**19.183**
180	1.000	0.000	0.000	1.000	18.800	18.800	1.412	21.624	**22.273**
200	1.000	0.000	0.000	1.000	22.400	22.400	2.152	26.704	**27.505**
220	1.000	0.000	0.000	1.000	26.200	26.200	2.666	31.532	**32.478**
240	1.000	0.000	0.000	1.000	30.700	30.700	3.181	37.062	**38.174**
300	1.000	0.000	0.000	1.000	42.200	42.200	4.248	50.696	**52.217**
360	1.000	0.000	0.000	1.000	57.100	57.100	8.226	73.552	**75.759**

TYPE 1

ELEVATION

Sign No	Sign Symbol	Size	Dimension	Area	Remarks
1		0.90	½ x 0.90 x 0.779	0.351	For Somespecial cases, size will be 1.10m where the area becomes 0.524m²
2		0.90	3.14 x 0.45²	0.636	
3		0.90	2 x 0.373 x 0.90	0.671	
4		-	0.45 x 0.60	0.270	
5			0.60 x 0.90	0.540	
6			0.20 x 0.60	0.120	For four digits, the size will be 0.20 x 0.80.
7		0.90		0.579	
8		1.20		1.028	

Type	*No*	*Sign Symbol*	*Description*	*Remarks*
WARNING SIGNS	1		Right bend منعطف يمين	
	2		Left Bend منعطف يسار	
	3		Sharp Bend منعطف حاد يمين	
	4		Sharp Bend منعطف حاد يسار	
	5		Dangerous Bends L-R منعطف اولهما يمين	
	6		Dangerous Bends R-L منعطف اولهما يسار	
	7		Reverse Bend R-L طريق متعرج يمين	
	8		Reverse Bend L-R طريق متعرج يسار	
	9		Road Narrows طريق ضيق	
	10		Road Narrows Keep Right طريق يضيق من اليسار	
	11		Road Narrows Keep Left طريق يضيق من اليمين	
	12		Narrow Bridge الطريق يضيق من الجانبين	

Type	*No*	*Sign Symbol*	*Description*	*Remarks*
WARNING SIGNS	13		One Lane Bridge الطريق يضيق من الجانبين	
	14		Divided Road Begins الطريق يتسع و يفصل بجزيرة وسطية	
	15		Divided Road Ends الطريق يضيق نهاية الجزيرة الوسطية	
	16		Two-Way Traffic طريق ذو اتجاهين	
	17		Merge اندماج من اليمين	
	18		Merge اندماج من اليسار	
	19		Merge تقاطع طريقان اندماج من ناحية اليمين	
	20		Side Road تقاطع طريقان الأولوية للطريق الرئيسي	
	21		Side Road تقاطع طريقان الأولوية للطريق الرئيسي	
	22		Cross Road تقاطع طريقان الأولوية للطريق الرئيسي	
	23		Cross Road تقاطع طريقان	
	24		اتجاه مستدير Traffic Rotary	

Type	*No*	*Sign Symbol*	*Description*	*Remarks*
WARNING SIGNS	25		Irish Crossing امامك طريق منخفض	
	26		Rail Road Crossing with Gates معبر خطوط حديدية مع بوابة	
	27		Rail Road Cross. w. gates معبر خطوط حديدية مع بوابة	
	28		Children Crossing معبر أطفال	
	29		Pedestrian Crossing معبر مشاه	
	30		Animal Crossing منطقة عبور جمال	
	31		Animal Crossing معبر الحيوانات	
	32		Cyclists معبر دراجات	
	33		Cross Wind مهب رياح	
	34		Sand Dunes كثبان ملية	
	35		Falling Rocks صخور متساقطة	
	36		Loose Gravel حصى متناثرة	

Type	*No*	*Sign Symbol*	*Description*	*Remarks*
WARNING SIGNS	37		Slippery Road طريق زلق	
	38		Dip منخفض	
	39		Hump مطب	
	40		Rumble Strip سلسلة مطبات	
	41		Rough Road طريق غير مستوي	
	42		Dangerous Shoulder كتف منخفض	
	43		Tunnel نفق	
	44		Road Leads to quay or river bank الطريق يتجه لنهاية حافة رصيف بحري أو نهري	
	45		Fire Station مركز إطفاء	
	46		Airport طيران منخفض	
	47		Signal Ahead انتبه اشارات الكهربائية	
	48		Descent منحدر	

Type	No	Sign Symbol	Description	Remarks
WARNING SIGNS	49		Ascent صعود	
	50		Low Clearance اقصى ارتفاع	
	51		Stop Ahead أمامك علامة قف	
	52		Give Way Ahead امامك افضلية	
	53		Live Electricity تيار كهربائي	
	54		Hazard/ Other Danger احذر	
	55		Chevron alignment علامات سهمية لتحذير عند المنحنيات (شيفرون)	
	56		Chevron alignment علامات سهمية لتحذير عند المنحنيات (شيفرون)	
REGULATORY SIGNS	57		Speed Limit تحديد السرعة	
	58		Pass Either Side اتجاه السير الاجباري لليمين أو اليسار	
	59		Mandatory Movement -Lt اتجاه السير الاجاباري الي اليسار	
	60		Mandatory Movement -Rt اتجاه السير الاجاباري الي اليمين	

Type	No	Sign Symbol	Description	Remarks
REGULATORY SIGNS	61		Mandatory Movement اتجاه السير الاجباري الي الامام	
	62		Pass this side (left) اتجاه اجباري ألزم اليسار	
	63		Pass this side (Right) اتجاه اجباري ألزم اليمين	
	64		Mandatory Movet. (U-turn) اتجاه السير الاجباري للالتفاف الي الخلف	
	65		Mandatory Movement اتجاه السير الاجباري الي الامام أو الالتفاف للخلف	
	66		Pass This Side اتجاه السير الاجباري الي اليمين أو اليسار	
	67		Mandatory Movement - toward Left اتجاه السير الاجباري الي اليسار	
	68		Mandatory Movement - toward Right اتجاه السير الاجباري الي اليمين	
	69		Mandatory Movt. اتجاه السير الاجباري الي امام أو اليسار	
	70		Mandatory Movt. اتجاه السير الاجباري الي الامام أو اليمين	
	71		Traffic Rotary اتجاه السير الاجباري في الدوار	
	72		Parking and Stopping prohibited ممنوع الانتظار قطعها	

Type	No	Sign Symbol	Description	Remarks
REGULATORY SIGNS	73		Parking Restricted prohibited ممنوع الوقوف والانظار فطعها	
	74		Foot Path مسار المشاة	
	75		Cycle Path مسار الدراجات الهوائية	
	76		Ridden Animal Path مسار الحيوانات	
	77		Compulsory Minimum السرعة اكثر من 35 كم	
	78		Minimum Speed نهاية ادنى سرعة اجباري	
	79		End of speed limit نهاية السريعة 35 كم	
	80		End of prohibitions نهاية منطقة تحديد السريعة	
	81		End of overtaking by trucks prohibited نهاية ممنوع التجاوز للشاحنات	
	82		End of overtaking prohibited نهاية ممنوع التجاوز	
	83		Motorcycles only ممنوع دخول المركبات عدا الدراجات الآلية	
	84		Motor cycles prohibited ممنوع المرور للدراجات النارية	

Type	No	Sign Symbol	Description	Remarks
REGULATORY SIGNS	85		Mopeds prohibited ممنوع دخول الدراجات قطعها	
	86		Cycles Prohibited ممنوع الدخول الدراجات الهوائية	
	87		Motor vehicles prohibited ممنوع دخول السيارات والدرجات النارية	
	88		Animal Carts prohibited ممنوع دخول العربات التي يقطرها حيوان	
	89		All vehicles prohibited ممنوع دخول السيارات والتي يقطرها حيوان والدرجات النارية قطعها	
	90		Farm Equipment Prohibited ممنوع دخول مركبات الاشغال العام	
	91		No Entry for Buses ممنوع دخول الحافلات قطعها	
	92		Drawn Trailer Prohibited ممنوع دخول العربات المقطورة قطعيا	
	93		Hand Cards Prohibited ممنوع دخول عربات البضائع المدفوعة باليد	
	94		Pedestrian prohibited ممنوع دخول المشاة	
	95		No Horns ممنوع استعمال المنبه	
	96		No Left Turn ممنوع الانجاه الى اليسار	

Type	No	Sign Symbol	Description	Remarks
REGULATORY SIGNS	97		No Right Turn ممنوع الانجاه الى اليمين	
	98		No U-Turn ممنوع الدوران للخلف قطعيا	
	99		Oncoming Traffic Priority for افضلية للسيارات المتجهة من الجهة المقابلة	
	100	جمارك CUSTOMS	Customs قف - جمارك	
	101		Overtaking Prohibited ممنوع التجاوز	
	102		Overtaking by Trucks prohibited ممنوع التجاوز للمشاحنات	
	103	٧٠ ٥٠	Speed Limit تحديد سرعة مختلفة حسب نوع السيارات	
	104	١٢م	Long Vehicles Prohibited القصى طول لشاحنة	
	105	٣ طن	Goods Vehicles Prohibited ممنوع المرور للسيارات المعدة لتقل البضائع والتي يزيد وزنها عن --	
	106	٣ طن	Restricted Load ممنوع مرور الشاحنات التي حمولة كل دولاب منها 3 طن	
	107	٥ طن	Restricted Loads ممنوع مرور الشاحنات التي تزيد حمولتها 5 طن	
	108	٣م	Restricted Clearance ممنوع مرور الشاحنات التي تفوق علوها 3 متر	

Type	No	Sign Symbol	Description	Remarks
REGULATORY SIGNS	109	٢م	Restricted Clearance ممنوع مرور الشاحنات التي يزيد عرضها عن 2 متر	
	110		Entry Prohibited ممنوع الدخول لعموم السيارات	
	111	قف	Stop قف	
	112	٢٢ ١ ٣ ٣	Kilometry	

Type	*No*	*Sign Symbol*	*Description*	*Remarks*
INFORMATIVE SIGNS	113		Picnic Site حمنزه	
	114		Camping Site مقـر للمخيم	
	115		Gas station محطة بنزين	
	116		Refreshments مقهى	
	117		Restaurant مطعم	
	118		Hotel فندق	

Type	*No*	*Sign Symbol*	*Description*	*Remarks*
INFORMATIVE SIGNS	119		Hospital مستشفى	
	120		First Aid Station مركز اسعاف	
	121		Bus Stop موقف حافلات	
	122		Parking موقف	
	123		No Through Road نهاية طريق طريق غير نافذ	

Type	*No*	*Sign Symbol*	*Description*	*Remarks*
	124		Telephone هاتف	
INFORMATIVE SIGNS	125		Mechanic مركز للتصليح	
	126		End of Freeway Motorway نهايـة طريق حر الحركة	
	127			

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائية

Project : Page: __1_ of _1_

Item : 9050101 Sign Face — Drwg. No. _____

9050501 Break Away Pipe

Sign No	Staion	Location	Sign Symbol	Dimension	Area (m²)	No. of Posts	Remarks	Enter Code
HS 01				3.14 x 0.45²	0.636	1		2
HS 02				3.14 x 0.45²	0.636	1		2
HS 03				2 x 0.373 x 0.90	0.671	1		3
HS 04				0.45 x 0.60	0.270	1		4
HS 05				0.60 x 0.90	0.540	1		5
HS 06				0.20 x 0.60	0.120	1		6
HS 07				Check Detailed Diagram	0.579	1		7
HS 08				Check Detailed Diagram	1.028	1		8
				Sub Total 1	4.480	8		

Suprv'g. Consultant :		Contractor :
0	0	M. A. AL SWAILEM CO.
Quantity Surveyor / Res. Engineer		Quantity Surveyor / Proj. Manager

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
0	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	M. A. AL SWAILEM CO.

FINAL QUANTITIES
الكميات النهائيه

Project : 0 Page: __1_ of _1_

Item : 9050101 Sign Face Drwg. No. _____

9050501 Break Away Pipe

9050101 Sign Face

9050501 Break Away Pipe

SUMMARY

Item NO.	Description	Unit	Total	Ref. Page
9050101	Sign Face	m²	4.480	page 1 of 2
9050501	Break Away Pipe		8	page 1 of 2

Suprv'g. Consultant :		Contractor :
0	0	M. A. AL SWAILEM CO.
Quantity Surveyor Res. Engineer		Quantity Surveyor Proj. Manager

Suprv'g. Consultant : **Saud Consult**	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : **M.A. Al Swailem Co.**
Project :	HAIL - ABU AJRAM ROAD	

STEEL FOR FOOTING OF HIGHWAY SIGN POST

Sign No:	No. of Post = 2
Station :	I.P.E Size = 200 Footing Width = 2.800

BAR MARK	SHAPE AND DIMENSION	Size	Length (m)	Spacing (m)	No of Pieces	Total Length	Unit Wt. (Kg/m)	Weight (Kg)
A	2700	12	2.700	As Drwg.	8 x 2 = 16	43.200	0.888	38.362
B	900 / 120 / 700	12	3.440	0.30	10 x 2 = 20	68.800	0.888	61.094
							Total =	*99.456*

Suprv'g. Consultant : **Saud Consult**	Project : HAIL - ABU AJRAM ROAD	Contractor : **M.A. Al Swailem Co.**
Qty. Surveyor Res. Engineer		Qty. Surveyor Res. Engineer

Suprv'g. Consultant :	THE KINGDOM OF SAUDI ARABIA	Contractor :
Saud Consult	MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	**M.A. Al Swailem Co.**

Project : **HAIL - ABU AJRAM ROAD**

STEEL FOR FOOTING ON HIGHWAY SIGN POST

SL No.	BAR MARK	SHAPE AND DIMENSION	Size (mm)	Length (m)	Spacing (m)	No of Pieces	Total Length	Unit Wt. (Kg/m)	Weight (Kg)
1	Sign No: 01 Station: 308+550 Rt				No. of Post = 2		I.P.E Size = 240 Footing Width = 3.30		
	A	3200	12	3.200	As Drwg.	8 x2 = 16	51.200	0.888	45.466
	B	900 / 120 / 700	12	3.440	0.30	12 x2 24	82.560	0.888	73.313
								Sub Total- 1 =	118.779
2	Sign No: 02 Station : 309+550 Rt				No. of Post = 2		I.P.E Size = 240 Footing Width = 3.30		
	A	3200	12	3.200	As Drwg.	8 x2 = 16	51.200	0.888	45.466
	B	900 / 120 / 700	12	3.440	0.30	12 x2 24	82.560	0.888	73.313
								Sub Total- 2 =	118.779
3	Sign No: 04 Station : 310+015 Rt				No. of Post = 2		I.P.E Size = 200 Footing Width = 2.80		
	A	2700	12	2.700	As Drwg.	8 x2 = 16	43.200	0.888	38.362
	B	900 / 120 / 700	12	3.440	0.30	10 x2 20	68.800	0.888	61.094
								Sub Total- 3 =	99.456
4	Sign No: 10 Station : 310+015 Rt				No. of Post = 2		I.P.E Size = 240 Footing Width = 3.40		
	A	3300	12	3.300	As Drwg.	8 x2 = 16	52.800	0.888	46.886
	B	900 / 120 / 700	12	3.440	0.30	12 x2 24	82.560	0.888	73.313
								Sub Total- 4 =	120.200
								Sub Total =	**338.435**

Suprv'g. Consultant :		Contractor :	
Saud Consult	**HAIL - ABU AJRAM ROAD**	**M.A. Al Swailem Co.**	
Qty. Surveyor	Res. Engineer	Qty. Surveyor	Proj. Manager

HARMAIN ROAD 104+550 R/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND											
1	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5	10	12.5				
	LEVEL	18.57	18.51	17.98	17.46	17.46	17.46				
	SLOPE		0.212	0.208	0.000	0.000					
			5	5							

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		17.408	17.460	17.460

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

RAMP-B 0+660 I-C1 L/S (W= 3.00 m H= 2.60 m)(SUBMIT TO BE LATER)

EXISTING GROUND											
3	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5						
	LEVEL	17.71	17.66	17.52	17.37						
	SLOPE		0.056	0.060							
			18	17							

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV				

NO OF POST	
IPC	mm
FOOTING WIDTH	m

HARMAIN ROAD 106+425 R/S (W= 6.00 m H= 4.20 m) (SUBMIT TO BE LATER)

EXISTING GROUND											
4	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5						
	LEVEL	16.72	16.67	16.09	15.49						
	SLOPE		0.232	0.240							
			4	4							

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV				

NO OF POST	
IPC	mm
FOOTING WIDTH	m

LOOP-B 0+085 I-C1 L/S (W= 3.00 m H= 2.60 m) (SUBMIT TO BE LATER)

EXISTING GROUND											
7	POINT NO.	1	2	3	4						
	OFFSET	0	2.5	5	7.5						
	LEVEL	27.16	27.14	27.28	27.42						
	SLOPE		-0.056	-0.056							
			-18	-18							

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV				

NO OF POST	
IPC	mm
FOOTING WIDTH	m

RAMP-C 0+335 I-C1 L/S (W= 3.00 m H= 2.60 m)

EXISTING GROUND								
9	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	16.77	16.72	16.69	16.66	16.63	16.61	
	SLOPE		0.012	0.012	0.012	0.008		
			83	83	83	125		

	POST W	1 POST	2 POST			NO OF POST	2
2 POST	3	7.600	9.400			IPC	200 mm
ELEV		16.659	16.637			FOOTING WIDTH	2.6 m

ROAD 3 STA. 2+460 R/S (W= 5.50 m H= 4.80 m) (SUBMIT TO BE LATER)

EXISTING GROUND								
11	POINT NO.	1	2	3	4			
	OFFSET	0	2.5	5	7.5			
	LEVEL	16.84	16.81	16.43	16.06			
	SLOPE		0.152	0.148				
			7	7				

	POST W	1 POST	2 POST	3 POST		NO OF POST	
3 POST	5.5	7.688	9.750	11.813		IPC	mm
ELEV						FOOTING WIDTH	m

HARMAIN ROAD 106+765 R/S (W= 3.00 m H= 2.60 m) (SUBMIT TO BE LATER)

EXISTING GROUND								
13	POINT NO.	1	2	3	4			
	OFFSET	0	2.5	5	7.5			
	LEVEL	16.02	15.99	15.94	15.89			
	SLOPE		0.020	0.020				
			50	50				

	POST W	1 POST	2 POST			NO OF POST	
2 POST	3	7.600	9.400			IPC	mm
ELEV						FOOTING WIDTH	m

HARMAIN ROAD 107+650 L/S (W= 5.00 m H= 5.60 m)

EXISTING GROUND								
14	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	12.64	12.58	12.28	11.98	11.91	11.84	
	SLOPE		0.120	0.120	0.028	0.028		
			8	8	36	36		

	POST W	1 POST	2 POST	3 POST		NO OF POST	3
3 POST	5	7.625	9.500	11.375		IPC	300 mm
ELEV		11.977	11.924	11.872		FOOTING WIDTH	4.5 m

HARMAIN ROAD 106+525 L/S (W= 5.00 m H= 3.60 m)

EXISTING GROUND								
15	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	16.87	16.84	16.76	16.67	16.67	16.66	
	SLOPE		0.032	0.036	0.000	0.004		
			31	28	0	250		

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		16.670	16.670	16.665

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	3.3 m

ROAD 3 STA, 2+735 R/S (W= 3.00 m H= 2.60 m)

EXISTING GROUND								
16	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	22.29	22.26	22.14	22.01	21.94	21.88	
	SLOPE		0.048	0.052	0.028	0.024		
			21	19	0	42		

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		22.007	21.957	

NO OF POST	2
IPC	200 mm
FOOTING WIDTH	2.6 m

HARMAIN ROAD 106+225 L/S

EXISTING GROUND								
17	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	18.02	17.97	17.72	17.47	17.29		
	SLOPE		0.100	0.100	0.072			
			10	10	0			

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		17.463	17.333	

NO OF POST	2
IPC	200 mm
FOOTING WIDTH	2.6 m

ROAD 3 STA, 2+575 L/S (W= 4.50 m H= 4.20 m)

EXISTING GROUND								
18	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	1.25	
	LEVEL	19.17	19.13	18.61	17.15	17.14	17.13	
	SLOPE		0.208	0.584	0.004	-0.001		
			5	2	0	1		

	POST W	1 POST	2 POST	3 POST
3 POST	4.5	7.563	9.250	10.938
ELEV		17.150	17.139	17.130

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	3.4 m

ROAD 3 STA, 3+000 L/S (W= 3.00 m H= 2.60 m) (SUBMIT TO BE LATER)

EXISTING GROUND

19	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5						
	LEVEL	15.19	15.17	14.89	14.61						
	SLOPE		0.112	0.112							
			9	9							

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV				

NO OF POST	2
IPC	200 mm
FOOTING WIDTH	2.6 m

ROAD 3 STA, 3+300 R/S (W= 6.00 m H= 5.00 m)

EXISTING GROUND

21	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5	10	12.5				
	LEVEL	10.78	10.75	10.64	10.53	10.58	10.64				
	SLOPE		0.044	0.044	-0.020	-0.024					
			23	23	-50	-42					

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		10.535	10.580	10.634

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.3 m

ROAD 3 STA, 3+415 R/S (W= 6.00 m H= 3.20 m)

EXISTING GROUND

22	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5	10					
	LEVEL	14.74	14.69	14.60	14.52	14.45					
	SLOPE		0.036	0.032	0.028						
			28	31	36						

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		14.513	14.450	14.450

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	3.3 m

ROAD 3 STA, 3+600 L/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND

23	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5	10					
	LEVEL	10.13	10.10	9.79	9.48	9.34					
	SLOPE		0.124	0.124	0.056						
			8	8	18						

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		9.466	9.340	9.340

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 3 STA, 3+925 L/S (W= 5.00 m H= 6.00 m)

EXISTING GROUND								
24	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	9.49	9.44	9.39	9.34	9.41		
	SLOPE		0.020	0.020	-0.028			
			50	50	-36			

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		9.344	9.396	9.410

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.5 m

ROAD 3 STA, 3+815 R/S (W= 6.00 m H= 5.00 m)

EXISTING GROUND								
25	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	9.64	9.61	9.46	9.31	9.19	9.07	
	SLOPE		0.060	0.060	0.048	0.048		
			17	17	21	21		

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		9.298	9.190	9.082

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.5 m

ROAD 3 STA, 3+925 R/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND								
26	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	9.17	9.13	9.01	8.89	8.83		
	SLOPE		0.048	0.048	0.024			
			21	21	42			

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		8.884	8.830	8.830

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 3 STA, 4+475 R/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND								
27	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	9.17	9.14	9.12	9.11	8.88		
	SLOPE		0.008	0.004	0.092			
			125	250	11			

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		9.087	8.880	8.880

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 3 STA, 4+560 R/S

EXISTING GROUND								
28	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	8.46	8.43	8.50	8.58	8.62		
	SLOPE		-0.028	-0.032	-0.016			
			-36	-31	-63			

	POST W	1 POST	2 POST	3 POST
3 POST				
ELEV				

NO OF POST	
IPC	mm
FOOTING WIDTH	m

ROAD 3 STA, 4+725 L/S (W= 5.00 m H= 6.00 m) (SUBMIT TO BE LATER)

EXISTING GROUND								
29	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5			
	LEVEL	7.52	7.47	7.19	6.89			
	SLOPE		0.112	0.120				
			9	8				

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV				

NO OF POST	
IPC	mm
FOOTING WIDTH	m

ROAD 1 STA, 4+840 R/S (W= 4.00 m H= 3.80 m)

EXISTING GROUND								
30	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	7.83	7.79	7.52	7.25	6.97		
	SLOPE		0.108	0.108	0.112			
			9	9	9			

	POST W	1 POST	2 POST	
2 POST	4	7.800	10.200	
ELEV		7.216	6.948	

NO OF POST	2
IPC	240 mm
FOOTING WIDTH	3.7 m

ROAD 1 STA, 4+950 L/S (W= 5.00 m H= 5.40 m)

EXISTING GROUND								
31	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	7.96	7.93	7.70	7.47	7.21	6.94	
	SLOPE		0.092	0.092	0.104	0.108		
			11	11	10	9		

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		7.457	7.262	7.062

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.2 m

ROAD 1 STA, 4+150 L/S (W= 4.00 m H= 5.60 m)

EXISTING GROUND								
32	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	6.86	6.82	6.58	6.34	6.20	6.05	
	SLOPE		0.096	0.096	0.056	0.060		
			10	10	18	17		

	POST W	1 POST	2 POST	
2 POST	4	7.800	10.200	
ELEV		6.323	6.188	

NO OF POST	2
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 2 STA, 1+375 R/S (W= 5.00 m H= 5.60 m)

EXISTING GROUND								
33	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	6.75	6.72	6.53	6.33	6.25	6.18	
	SLOPE		0.076	0.080	0.032	0.028		
			13	13	31	36		

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		6.326	6.266	6.212

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.5 m

ROAD 2 STA, 1+025 R/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND								
34	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	8.81	8.77	8.45	8.22	8.23	8.24	
	SLOPE		0.128	0.092	-0.004	-0.004		
			8	11	-250	-250		

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		8.221	8.230	8.239

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 2 STA, 1+525 R/S (W= 5.00 m H= 3.80 m)

EXISTING GROUND								
35	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	6.14	6.11	6.05	5.98	5.85	5.73	
	SLOPE		0.024	0.028	0.052	0.048		
			42	36	19	21		

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		5.974	5.876	5.784

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	3.3 m

ROAD 2 STA, 1+775 R/S (W= 5.00 m H= 5.60 m)

EXISTING GROUND							
36	POINT NO.	1	2	3	4	5	6
	OFFSET	0	2.5	5	7.5	10	12.5
	LEVEL	7.44	7.39	7.14	6.88	6.83	6.78
	SLOPE		0.100	0.104	0.020	0.020	
			10	10	50	50	

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		6.878	6.840	6.803

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.5 m

ROAD 2 STA, 1+900 R/S (W= 5.00 m H= 3.80 m)

EXISTING GROUND							
37	POINT NO.	1	2	3	4	5	6
	OFFSET	0	2.5	5	7.5	10	
	LEVEL	7.53	7.50	7.55	7.60	7.82	
	SLOPE		-0.020	-0.020	-0.088		
			-50	-50	-11		

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		7.611	7.776	7.820

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	3.3 m

ROAD 2 STA, 2+275 R/S (W= 5.00 m H= 5.60 m)

EXISTING GROUND							
38	POINT NO.	1	2	3	4	5	6
	OFFSET	0	2.5	5	7.5	10	
	LEVEL	8.28	8.25	8.08	7.91	7.87	
	SLOPE		0.068	0.068	0.016		
			15	15	62		

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		7.908	7.878	7.870

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.5 m

ROAD 2 STA, 2+425 R/S (W= 5.00 m H= 3.80 m)

EXISTING GROUND							
39	POINT NO.	1	2	3	4	5	6
	OFFSET	0	2.5	5	7.5	10	
	LEVEL	8.23	8.20	8.07	7.94	7.62	
	SLOPE		0.052	0.052	0.128		
			19	19	8		

	POST W	1 POST	2 POST	3 POST
3 POST	5	7.625	9.500	11.375
ELEV		7.924	7.684	7.620

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	303 m

HARMAIN ROAD 108+350 L/S (W= 4.50 m H= 4.40 m)

EXISTING GROUND												
41	POINT NO.	1		2		3		4		5		6
	OFFSET	0		2.5		5		7.5		10		12.5
	LEVEL	9.73		9.69		9.13		8.66		8.34		8.02
	SLOPE				0.224		0.188		0.128			
					4		5		8			

	POST W	1 POST	2 POST	3 POST
3 POST	4.5	7.563	9.250	10.938
ELEV		8.652	8.436	8.340

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	3.4 m

ROAD 2 STA, 2+425 L/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND												
42	POINT NO.	1		2		3		4		5		6
	OFFSET	0		2.5		5		7.5		10		12.5
	LEVEL	8.60		8.55		8.02		7.53		7.50		7.47
	SLOPE				0.212		0.196		0.012		0.012	
					5		5		83		83	

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		7.527	7.500	7.473

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 2 STA, 2+385 L/S (W= 6.00 m H= 4.60 m)

EXISTING GROUND												
43	POINT NO.	1		2		3		4		5		6
	OFFSET	0		2.5		5		7.5		10		12.5
	LEVEL	8.56		8.52		7.99		7.46		7.43		7.40
	SLOPE				0.212		0.212		0.012		0.012	
					5		5		83		83	

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		7.457	7.430	7.403

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.3 m

ROAD 2 STA, 1+940 L/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND												
44	POINT NO.	1		2		3		4		5		6
	OFFSET	0		2.5		5		7.5		10		12.5
	LEVEL	7.74		7.69		7.47		7.24		7.18		7.11
	SLOPE				0.088		0.092		0.024		0.028	
					11		11		42		36	

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		7.234	7.180	7.117

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 2 STA, 1+875 L/S (W= 6.00 m H= 4.60 m)

EXISTING GROUND											
45	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5	10	12.5				
	LEVEL	7.65	7.61	7.44	7.27	7.25	7.22				
	SLOPE		0.068	0.068	0.008	0.012					
			15	15	125	83					

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		7.268	7.250	7.223

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.3 m

ROAD 2 STA, 1+400 L/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND											
46	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5	10	12.5				
	LEVEL	6.77	6.73	6.51	6.30	6.22	6.14				
	SLOPE		0.088	0.084	0.032	0.032					
			11	12	31	31					

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		6.292	6.220	6.148

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 1 STA, 2+650 R/S (W= 6.00 m H= 4.60 m)

EXISTING GROUND											
47	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5	10	12.5				
	LEVEL	9.12	9.08	9.07	9.06	8.76	8.45				
	SLOPE		0.004	0.004	0.120	0.124					
			250	250	8	8					

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		9.030	8.760	8.481

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.3 m

ROAD 1 STA, 2+525 L/S (W= 6.00 m H= 6.00 m)

EXISTING GROUND											
48	POINT NO.	1	2	3	4	5	6				
	OFFSET	0	2.5	5	7.5	10					
	LEVEL	7.94	7.89	7.63	7.38	6.53					
	SLOPE		0.104	0.100	0.340						
			10	10	3						

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		7.295	6.530	6.530

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

ROAD 1 STA, 1+800 L/S (W= 3.00 m H= 2.60 m)

EXISTING GROUND								
50	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	8.51	8.47	8.23	8.00	7.48		
	SLOPE		0.096	0.092	0.208			
			10	11	5			

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		7.979	7.605	

NO OF POST	2
IPC	220 mm
FOOTING WIDTH	2.8 m

ROAD 1 STA, 1+300 L/S (W= 4.50 m H= 4.20 m)

EXISTING GROUND								
51	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	16.71	16.68	16.48	16.30	16.11		
	SLOPE		0.080	0.072	0.076			
			13	14	13			

	POST W	1 POST	2 POST	3 POST
3 POST	4.5	7.563	9.250	10.938
ELEV		16.295	16.167	16.110

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	3.7 m

ROAD 1 STA, 1+480 R/S (W= 3.00 m H= 2.60 m) (SUBMIT TO BE LATER)

EXISTING GROUND								
52	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10		
	LEVEL	13.33	13.30	13.33	13.36			
	SLOPE		-0.012	-0.012				
			-83	-83				

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV				

NO OF POST	
IPC	mm
FOOTING WIDTH	m

HARMAIN ROAD 110+700 L/S (W= 5.50 m H= 3.40 m)

EXISTING GROUND								
53	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	7.44	7.39	7.44	7.48	7.54	7.60	
	SLOPE		-0.020	-0.016	-0.024	-0.024		
			-50	-62	-42	-42		

	POST W	1 POST	2 POST	3 POST
3 POST	5.5	7.688	9.750	11.813
ELEV		7.485	7.534	7.584

NO OF POST	3
IPC	240 mm
FOOTING WIDTH	3.2 m

HARMAIN ROAD 111+235 L/S (W= 3.00 m H= 2.60 m)

EXISTING GROUND												
54	POINT NO.	1	2	3	4	5	6					
	OFFSET	0	2.5	5	7.5	10	12.5					
	LEVEL	5.20	5.15	5.13	5.11	5.18	5.26					
	SLOPE			0.008	0.008	-0.028	-0.032					
				125	125	-36	-31					

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		5.113	5.163	

NO OF POST	2
IPC	200 mm
FOOTING WIDTH	2.6 m

HARMAIN ROAD 111+919 L/S (W= 5.50 m H= 6.00 m)

EXISTING GROUND												
56	POINT NO.	1	2	3	4	5	6					
	OFFSET	0	2.5	5	7.5	10	12.5					
	LEVEL	7.99	7.94	7.31	6.87	6.61	6.35					
	SLOPE			0.252	0.176	0.104	0.104					
				4	6	10	10					

	POST W	1 POST	2 POST	3 POST
3 POST	5.5	7.688	9.750	11.813
ELEV		6.851	6.636	6.422

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.7 m

HARMAIN ROAD 110+900 R/S (W= 3.00 m H=2.60 m) (SUBMIT TO BE LATER)

EXISTING GROUND												
57	POINT NO.	1	2	3	4	5	6					
	OFFSET	0	2.5	5	7.5	10	12.5					
	LEVEL	7.70	7.65	7.71	7.78							
	SLOPE			-0.024	-0.028							
				-42	-36							

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		7.780	0.000	

NO OF POST	
IPC	mm
FOOTING WIDTH	m

ROAD 1 STA, 1+140 R/S (W= 5.50 m H=4.80 m)

EXISTING GROUND												
58	POINT NO.	1	2	3	4	5	6					
	OFFSET	0	2.5	5	7.5	10	12.5					
	LEVEL	16.66	16.62	16.25	15.88	15.34						
	SLOPE			0.148	0.148	0.216						
				7	7	5						

	POST W	1 POST	2 POST	3 POST
3 POST	5.5	7.688	9.750	11.813
ELEV		15.840	15.394	15.340

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.3 m

ROAD 1 STA, 0+685 R/S (W= 3.00 m H=2.60 m) (SUBMIT TO BE LATER)

EXISTING GROUND								
59	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	12.60	12.56	12.46	12.36			
	SLOPE		0.040	0.040				
			25	25				

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		12.360	0.000	

NO OF POST	
IPC	mm
FOOTING WIDTH	m

ROAD 1 STA, 1+150 R/S (W= 6.00 m H=6.00 m)

EXISTING GROUND								
61	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	11.41	11.36	11.33	11.30	11.30	11.30	
	SLOPE		0.012	0.012	0.000	0.000		
			83	83				

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		11.300	11.300	11.300

NO OF POST	3
IPC	360 mm
FOOTING WIDTH	5.4 m

ROAD 1 STA, 0+980 L/S (W= 3.00 m H=2.60 m)

EXISTING GROUND								
62	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	16.34	16.28	16.04	15.80	15.85	15.19	
	SLOPE		0.096	0.096	-0.020	0.264		
			10	10	-50	4		

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		15.802	15.838	

NO OF POST	2
IPC	200 mm
FOOTING WIDTH	2.6 m

HARMAIN ROAD 110+625 R/S (W= 6.00 m H=4.20 m)

EXISTING GROUND								
63	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	9.24	9.21	8.91	8.61	8.53	8.45	
	SLOPE		0.120	0.120	0.032	0.032		
			8	8	31	31		

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		8.602	8.530	8.458

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4 m

HARMAIN ROAD 110+025 R/S (W= 3.00 m H=2.60 m)

EXISTING GROUND								
64	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	8.27	8.23	8.21	8.20	8.20	8.19	
	SLOPE		0.008	0.004	0.000	0.004		
			125	250		250		

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		8.200	8.200	

NO OF POST	2
IPC	200 mm
FOOTING WIDTH	2.6 m

HARMAIN ROAD 108+900 R/S (W= 6.00 m H=6.00 m)

EXISTING GROUND								
66	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	9.27	9.23	8.57	7.91	7.59	12.50	
	SLOPE		0.264	0.264	0.128	-1.964		
			4	4	8	-1		

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		7.878	7.590	12.009

NO OF POST	3
IPC	300 mm
FOOTING WIDTH	4.9 m

HARMAIN ROAD 108+875 L/S (W= 3.00 m H=2.60 m)

EXISTING GROUND								
67	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	7.18	7.13	7.01	6.49	6.39	6.36	
	SLOPE		0.048	0.208	0.040	0.012		
			21	5	25	83		

	POST W	1 POST	2 POST	
2 POST	3	7.600	9.400	
ELEV		6.486	6.414	

NO OF POST	2
IPC	200 mm
FOOTING WIDTH	2.6 m

HARMAIN ROAD 109+500 L/S (W= 6.00 m H=6.60 m)

EXISTING GROUND								
69	POINT NO.	1	2	3	4	5	6	
	OFFSET	0	2.5	5	7.5	10	12.5	
	LEVEL	8.61	8.56	8.55	8.54	8.94	9.35	
	SLOPE		0.004	0.004	-0.160	-0.164		
			250	250	-6	-6		

	POST W	1 POST	2 POST	3 POST
3 POST	6	7.750	10.000	12.250
ELEV		8.580	8.940	9.309

NO OF POST	3
IPC	360 mm
FOOTING WIDTH	5.3 m

الإشارات المعلقة والكابولية

GANTRY AND CANTILEVER SIGN

Structural Details :

Post Dia. : 508mm (20") Extra Strong
Radius : 3050mm
Split : 127 mm
Base Plate Size : Ø1016 x 76mm thick.
Anchor Bolt Size : M64 x 12 x 1200, BCD : 838mm

G-STA-105+550-RHS

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL -OWAIDAH FOR INDUSTRIES
TEL# 4484422 FAX #4488888

PROJECT: HIGHWAYS TYING KING ABDULLAH SPORT CITY IN JEDDAH & RELEVANT JUNCTIONS

CONSULTANT:

CONTRACTOR :	SIGN NO		STATION	SIDE
MOH. A. AL-SWAILEM CO.	2		105+550	R/S

-1HPSC0229

-2STA-100+109-LHS-Model

Structural Details :

Post Dia. : 610mm (24") Extra Strong
Radius : 3660mm
Split : 127 mm
Base Plate Size : ø1067 x 64mm thick.
Anchor Bolt Size : M64 x 14 x 1200,
BCD : 900mm

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL-OWAIDAH FOR INDUSTRIES
TEL# 4464422 FAX #4469999

PROJECT : HIGHWAYS TYING KING ABDULLAH SPORT CITY IN JEDDAH & RELEVANT JUNCTIONS

CONSULTANT

CONTRACTOR :	SIGN NO	SIGN M²	STATION	SIDE
MOH. A. AL-SWAILEM CO.	55	74.7 M²	109+550	R/S

Structural Details :

Post Dia. : 610mm (24") Extra Strong
Radius : 3660mm
Split : 127 mm
Base Plate Size : Ø1067 x 64mm thick.
Anchor Bolt Size : M64 x 14 x 1200,
BCD : 908mm

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL-OWAIDAH FOR INDUSTRIES
TEL# 4454482 FAX #4400668

PROJECT: HIGHWAYS TYING KING ABDULLAH SPORT CITY IN JEDDAH & RELEVANT JUNCTIONS

CONSULTANT:

CONTRACTOR :	SIGN NO		STATION	SIDE
MOH. A. AL-SWAILEM CO.	55		111+450	L/S

-4HPSC0230

-5G-STA-775+0-RHS-Model

Structural Details :

Post Dia. : 508mm (20") Extra Strong
Radius : 3050mm
Split : 127 mm
Base Plate Size : Ø1016 x 75mm thick.
Anchor Bolt Size : M64 x 12 x 1200, BCD : 838mm

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T

G-STA-0+500-RHS

AL-OWAIDAH FOR INDUSTRIES TEL# 4494422 FAX #4490060	PROJECT	HIGHWAYS TYING KING ABDULLAH SPORT CITY IN JEDDAH & RELEVANT JUNCTIONS			CONSULTANT
	CONTRACTOR :	SIGN NO	STATION	SIDE	
	MOH. A. AL-SWAILEM CO.	00	R1 0+500	R/S	

G-STA-2+100-LHS

Structural Details :

Post Dia. : 508mm (20") Extra Strong
Radius : 3050mm
Split : 127 mm
Base Plate Size : 610 x 76 x 76mm thk.
Anchor Bolt Size : M64 x 12 x 1200, BCD : 838mm

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL -OWAIDAH FOR INDUSTRIES
TEL# 4494422 FAX #4499088

PROJECT: HIGHWAYS TYING KING ABDULLAH SPORT CITY IN JEDDAH & RELEVANT JUNCTIONS

CONSULTANT

CONTRACTOR :	SIGN NO		STATION	SIDE
MOH. A. AL-SWAILEM CO.	40		R1 2+100	L/S

-7HPSC0227

Structural Details :

Post Dia. : 508mm (20") Extra Strong
Radius : 3060mm
Split : 127 mm
Base Plate Size : Ø1016 x 76mm thick.
Anchor Bolt Size : M64 x 12 x 1200,
BCD : 838mm

G-STA-2+950-RHS

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL-OWAIDAH FOR INDUSTRIES TEL# 4494422 FAX #4499065	PROJECT	HIGHWAYS TYING KING ABDULLAH SPORT CITY IN JEDDAH & RELEVANT JUNCTIONS			CONSULTANT
	CONTRACTOR :	SIGN NO		STATION	SIDE
	MOH. A. AL-SWAILEM CO.	40		R2 2+950	R/S

Structural Details :

Post Dia. : 508mm (20") Extra Strong
Radius : 308mm
Split : 137 mm
Base Plate Size : Ø1016 x 70mm thick.
Anchor Bolt Size : M64 x 12 x 1200,
BCD : 830mm

G-STA-1+525-RHS

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL -OWAIDAH FOR INDUSTRIES
TEL# 4484422 FAX #4469066

PROJECT: HIGHWAYS TYING KING ABDULLAH SPORT CITY IN JEDDAH & RELEVANT JUNCTIONS

CONSULTANT:

CONTRACTOR:	SHOM NO		STATION	SIDE
MOH. A. AL-SWAILEM CO.	9		R2 1+525	R/S

G-STA-3+150-LHS

Structural Details :

Post Dia. : 508mm (20") Extra Strong
Radius : 3950mm
Split : 127 mm
Base Plate Size : Ø1016 x 76mm thick.
Anchor Bolt Size : M64 x 12 x 1200,
BCD : 838mm

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL -OWAIDAH FOR INDUSTRIES
TEL/F 4494422 FAX 4488888

PROJECT

HIGHWAYS TYING KING ABDULLAH SPORT CITY IN JEDDAH & RELEVANT JUNCTIONS

CONSULTANT

CONTRACTOR :	SIGN NO		STATION	SIDE
MOH. A. AL-SWAILEM CO.	2/2		RS 3+150	L/S

-10HPSC0231

Consultant: EUROCONSULT	THE KINGDOM OF SAUDI ARABIA MINISTRY OF TRANSPORT GENERAL TECHNICAL ADMINISTRATION	Contractor : M. A. AL SWAILEM CO.

Project : *HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS*

9050501 GANTRY SIGNS

Page: 1 of 1

Drwg. No.

		SER. NO.	GANTRY SIGN NO.	STATION	GANTRY SIZE(IN.)	SPAN (M)	TOTAL WEIGHT (ton)	TOTAL WEIGHT (ton/m)
44.45	17.45	1	2	105+618.3RHS	20	27.00	11.560	0.260067492
39.4	16.9	2	5	0+775RHS	16	22.50	8.589	0.217994924
43.9	17.9	3	9	1+525RHS	20	26.00	10.724	0.24428246
44	16	4	20	3+150LHS	20	28.00	11.269	0.256113636
42.5	17.5	5	40	2+950RHS	20	25.00	9.945	0.234
41.2	16	6	49	2+100RHS	20	25.00	10.668	0.258932039
48.5	17	7	55	111+450LHS	24	32.00	13.725	0.282989691
45.5	18	8	60	0+500RHS	20	28.00	11.078	0.243472527
47.3	17	9	65	109+850RHS	24	30.00	13.487	0.285137421
45.1	17	10	68	109+100LHS	20	28.00	11.673	0.258824834
				TOTAL =			112.718	

Consultant EUROCONSULT	HIGHWAY TYING KASC IN JEDDAH & RELEVANT JUNCTIONS	Contractor : M. A. AL SWAILEM CO.
Qty. Surveyor / Resident Engr.		Qty. Surveyo / Proj. Manager

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL -OWAIDAH FOR INDUSTRIES TEL# 4484422 FAX #4469068	PROJECT	HUFAIR LINK ROAD				CONSULTANT
	CONTRACTOR : OTC AL OWAIDH TRADE & CONT. CO.	SIGN NO	SIGN M²	STATION	SIDE	SAUDI CONSOLIDATED ENGINEERING COMPANY KHATIB & ALAMI
		2		18+025	R/S	

APPROVED AND DONE ACCORDING TO SPECIFICATION OF M.O.T.

AL -OWAIDAH FOR INDUSTRIES TEL# 4484422 FAX #4469068	PROJECT	HUFAIR LINK ROAD				CONSULTANT
	CONTRACTOR : OTC AL OWAIDAH TRADA CONT.	SIGN NO	SIGN M²	STATION	SIDE	SAUDI CONSOLIDATED ENGINEERING COMPANY KHATIB & ALAMI
		15		20+090	L/S	

GANTRY FOUNDATIONS

GANTRY FOUNDATION TABLE

QUANTITY FOR ONE FOUNDATION MULTIPLY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 50 DIA BARS
2- STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH ARBTO
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D (35N/20)
-28 DAYS COMPRESSIVE STRENGTH FOR REINFORCED CONCRETE CULVERT fc=30 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE fc=25MPa (C20)
4.2 REINFORCING STEEL : Fy=420 MPa
5- CONCRETE COVER:
5.1 UNLESS OTHERWISE NOTED, 50MM CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED.
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED.
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXING .
6.2- ALL REINFORCING STEEL SHALL BE STRAIGHT, HIGH BOND, DEFORMED BARS CONFORMING TO AASHTO M31 REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATION.
8-GEOTECHNICAL DATA:
8.1-IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SITE ALLOWABLE BEARING CAPACITY IS MORE THAN 2 KG/CM²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, AND DURING EXCAVATION. IF WATER ENCOUNTERED THE CONTRACTOR SHALL INFORM THE ENGINEER ,SO THAT THE SUBSURFACE DRAINAGE SYSTEM AND THE SITE SHALL BE ESTABLISHED BEFORE POURING OF CONCRETE.
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 KG/CM²

No.	REVISION	DRW.	DATE
0	ISSUED FOR APPROVAL	DSC	JUNE 2015

Inner Foundation Coordinates & Levels

a-X=518942.768 Y=2405557.880 Z= 17.125
b-X=518944.550 Y=2405558.540 Z= 17.125
c-X=518942.047 Y=2405565.291 Z= 17.125
d-X=518940.265 Y=2405564.631 Z= 17.125
e-X=518941.847 Y=2405560.365 Z= 17.425
f-X=518943.629 Y=2405561.025 Z= 17.425
g-X=518942.968 Y=2405562.807 Z= 17.425
h-X=518941.187 Y=2405562.146 Z= 17.425

Outer Foundation Coordinates & Levels

a-X=518972.773 Y=2405569.003 Z= 16.290
b-X=518974.554 Y=2405569.663 Z= 16.290
c-X=518972.052 Y=2405576.414 Z= 16.290
d-X=518970.270 Y=2405575.754 Z= 16.290
e-X=518971.852 Y=2405571.487 Z= 16.590
f-X=518973.633 Y=2405572.148 Z= 16.590
g-X=518972.973 Y=2405573.929 Z= 16.590
h-X=518971.191 Y=2405573.269 Z= 16.590

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

CONSULTANT:
EURO CONSULT
يورو كونسلت للاستشارات الهندسية
P.o. Box 34433, Istanbul / Turkey
Tel. : +90 (212) 244 46 25
Fax : +90 (212) 244 46 35
http://www.euroconsult.com.tr

NAME OF PROJECT:
HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:
MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:26220 Code:11466
Tel. 01/4031888 Fax: 01/4121717

TITLE:
KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
HARAMAIN RD. @ STA.105+618.3 Rt.
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-548	00	JUNE 2015	Danny	Eng'r FAREED T.M	

GANTRY FOUNDATION TABLE

QUANTITY FOR ONE FOUNDATION MULTIPLY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 60 XD BARS
2- STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH AASHTO
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE
-STRUCTURAL CONCRETE FOR RETAINING WALL (CLASS D (300/20))
-28 DAYS COMPRESSIVE STRENGTH FOR REINFORCED CONCRETE (BLYEY) fc=30 MPa
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE fc=15MPa (Pedestal)
4.2 REINFORCING STEEL : Fy=420 MPa
5- CONCRETE COVER:
5.1 UNLESS OTHERWISE NOTED 50MM CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED.
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED.
6-MATERIAL:
6.1-ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXES .
6.2- ALL REINFORCING STEEL SHALL BE STRAIGHT, FREE BONE, DEFORMED BARS CONFORMING TO AASHTO M31 REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATIONS.
8-GEOTECHNICAL DATA:
8.1-IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SOIL ALLOWABLE BEARING CAPACITY IS MORE THAN 2 KN/CM²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, BOTH DURING EXCAVATION. IF WATER ENCOUNTERED CONTRACTOR SHALL DIVERT THE ENCOUNTER AND THAT THE SUBSURFACE DRAINAGE SYSTEM AND THE SITE SHALL BE OBTAINED BEFORE POURING OF CONCRETE.
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 KN/CM²

0	ISSUED FOR APPROVAL	DSC	JUNE 2015
No.	REVISION	DRW.	DATE

Inner Foundation Coordinates & Levels

a - X=517477.153 Y=2408686.237 Z= 8.336
b - X=517476.073 Y=2408685.057 Z= 8.336
c - X=517481.384 Y=2408680.195 Z= 8.336
d - X=517482.464 Y=2408681.376 Z= 8.336
e - X=517479.255 Y=2408684.313 Z= 8.636
f - X=517478.175 Y=2408683.133 Z= 8.636
g - X=517479.282 Y=2408682.120 Z= 8.636
h - X=517480.362 Y=2408683.300 Z= 8.636

Outer Foundation Coordinates & Levels

a - X=517458.238 Y=2408665.595 Z= 7.636
b - X=517457.157 Y=2408664.416 Z= 7.636
c - X=517462.465 Y=2408659.551 Z= 7.636
d - X=517463.546 Y=2408660.731 Z= 7.636
e - X=517460.339 Y=2408663.670 Z= 7.936
f - X=517459.258 Y=2408662.490 Z= 7.936
g - X=517460.364 Y=2408661.477 Z= 7.936
h - X=517461.445 Y=2408662.656 Z= 7.936

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

CONSULTANT:

EURO CONSULT
يورو كونسلت للاستشارات الهندسية

P.o. Box 34433, Istanbul / Turkey
Tel. : +90 (212) 244 46 25
Fax : +90 (212) 244 46 35
http://www.euroconsult.com.tr

NAME OF PROJECT:

HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:

MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:28280 Code:11468
Tel: 01/4051885 Fax: 01/4121717

TITLE:

KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
HARAMAIN RD @ STA.109+100 Lt.
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING

A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

Transmitted No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-548	00	JUNE 2015	Danny	Eng'r FAREED T.M	

GANTRY FOUNDATION TABLE

QUANTITY FOR ONE FOUNDATION MULTIPLY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 50 Db BARS
2-STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH AISC70
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE:
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D (300/20)
-28 DAYS COMPRESSIVE STRENGTH FOR REINFORCED CONCRETE ONLYFCC = 30 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE. fc=15MPa.
fcm=0
4.2 REINFORCED STEEL : Fy=420 MPa
5- CONCRETE COVER:
5.1 UNLESS OTHERWISE NOTED, BRIDGE CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED:
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED.
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXING .
6.2- ALL REINFORCING STEEL SHALL BE STRENGTH, HIGH BOND, DEFORMED BARS CONFORMING TO AASHTO M31. REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATION.
8-GEOTECHNICAL DATA:
8.1-IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SOIL ALLOWABLE BEARING CAPACITY IS MORE THAN 2 Kg/cm²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, BEFORE DURING EXCAVATION. IF WATER ENCOUNTERED, THE CONTRACTOR SHALL INFORM THE ENGINEER, BY THAT THE DEWATERING DRAINAGE SYSTEM AND THE SUB SHALL BE INSTALLED BEFORE POURING OF CONCRETE.
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 Kg/cm²

0	ISSUED FOR APPROVAL	DSC	JUNE 2015
No.	REVISION	DRW.	DATE

Inner Foundation Coordinates & Levels

a - X=517001.706 Y=2409038.150 Z= 6.836
b - X=517002.621 Y=2409039.815 Z= 6.836
c - X=516996.303 Y=2409043.274 Z= 6.836
d - X=516995.390 Y=2409041.607 Z= 6.836
e - X=516999.383 Y=2409039.424 Z= 7.136
f - X=517000.295 Y=2409041.091 Z= 7.136
g - X=516996.628 Y=2409042.003 Z= 7.136
h - X=516997.716 Y=2409040.337 Z= 7.136

Outer Foundation Coordinates & Levels

a - X=517016.111 Y=2409064.465 Z= 7.336
b - X=517017.023 Y=2409066.132 Z= 7.336
c - X=517010.707 Y=2409069.589 Z= 7.336
d - X=517009.795 Y=2409067.922 Z= 7.336
e - X=517013.787 Y=2409065.740 Z= 7.636
f - X=517014.700 Y=2409067.406 Z= 7.636
g - X=517013.032 Y=2409066.317 Z= 7.636
h - X=517012.121 Y=2409064.652 Z= 7.636

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

CONSULTANT:

euro consult
يورو كونسلت للاستشارات الهندسية

P.o. Box 34433, Istanbul / Turkey
Tel. : +90 (212) 244 46 25
Fax : +90 (212) 244 46 35
http://www.euroconsult.com.tr

NAME OF PROJECT:

HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:

MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:28280 Code:11465
Tel: 01/4031868 Fax: 01/4121717

TITILE:

KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
HARAMAIN RD @ STA.109+700 Rt.
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING:
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-548	00	JUNE 2015	Danny	Eng'r FAREED T.M	

GANTRY FOUNDATION TABLE

QUANTITY FOR ONE FOUNDATION MULTIPLY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 50 Db BARS
2-STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH ASSHTO
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE:
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D (300/38)
-28 DAYS COMPRESSIVE STRENGTH FOR REINFORCED CONCRETE CSI WERE fc=30 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE fc=25MPa (min)
4.2 REINFORCING STEEL : Fy=420 MPa
5- CONCRETE COVER:
EXCEPT AS OTHERWISE NOTED, 50MM CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED.
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED.
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXING .
6.2- ALL REINFORCING STEEL SHALL BE STRENGTH, HIGH BOND, DEFORMED BARS CONFORMING TO ASSHTO M31 REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATION.
8-GEOTECHNICAL DATA:
8.1-IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SOIL ALLOWABLE BEARING CAPACITY IS NOT LESS THAN 2 KG/CM²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, BOTH DURING EXCAVATION.
IF WATER REQUIRED THE CONTRACTOR SHALL INFORM THE ENGINEER AND THAT THE SUBSTRUCTURE DRAINAGE SYSTEM AND THE SITE SHALL BE DRAINED BEFORE POURING OF CONCRETE.
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 KG/CM²

Inner Foundation Coordinates & Levels

a - X=515297.639 Y=2409293.162 Z= 6.120
b - X=515298.002 Y=2409291.297 Z= 6.120
c - X=515305.070 Y=2409292.684 Z= 6.120
d - X=515304.704 Y=2409294.549 Z= 6.120
e - X=515300.240 Y=2409293.670 Z= 6.420
f - X=515300.606 Y=2409291.806 Z= 6.420
g - X=515302.470 Y=2409292.172 Z= 6.420
h - X=515302.104 Y=2409294.036 Z= 6.420

Outer Foundation Coordinates & Levels

a - X=515303.414 Y=2409263.746 Z= 5.820
b - X=515303.766 Y=2409261.878 Z= 5.820
c - X=515310.842 Y=2409263.212 Z= 5.820
d - X=515310.490 Y=2409265.079 Z= 5.820
e - X=515306.019 Y=2409264.234 Z= 6.120
f - X=515306.371 Y=2409262.367 Z= 6.120
g - X=515308.238 Y=2409262.721 Z= 6.120
h - X=515307.886 Y=2409264.586 Z= 6.120

No.	REVISION	DRW.	DATE
0	ISSUED FOR APPROVAL	BSC	JUNE 2015

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

CONSULTANT:

euro consult
يورو كونسلت للاستشارات الهندسية

P.o. Box 34433, Istanbul / Turkey
Tel. : +90 (212) 244 46 25
Fax : +90 (212) 244 46 35
http://www.euroconsult.com.tr

NAME OF PROJECT:

HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:

MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:36250 Code:11466
Tel: 01/4031866 Fax: 01/4121717

TITLE:

KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
HARAMAIN RD @ STA.111+450 Lt.
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-548	00	JUNE 2015	Danny	Eng'r FARRED T.M	

GANTRY FOUNDATION TABLE

QUANTITY FOR ONE FOUNDATION MULTIPLY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 50 XD BARS
2-STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH AASHTO
3- ALL DIMENSION ARE IN M
4- DESIGN STRESS
4.1 CONCRETE:
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D (20N/20)
-28 DAYS COMPRESSIVE STRENGTH FOR REINFORCED CONCRETE CULVERT fc=30 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE fc=15MPa. (min)
4.2 REINFORCING STEEL : Fy=420 MPa
5- CONCRETE COVER:
5.1 UNLESS OTHERWISE NOTED, 50MM CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED.
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED.
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXING .
6.2- ALL REINFORCING STEEL SHALL BE STRENGTH, DEFORMED BARS CONFORMING TO AASHTO M31 REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATION.
8-GEOTECHNICAL DATA:
8.1- IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SOIL ALLOWABLE BEARING CAPACITY IS MORE THAN 3 KG/CM²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, EIP DURING EXCAVATION.
IF WATER ENCOUNTERED THE CONTRACTOR SHALL REDUCE THE SUCHEER, BY THAT THE SURFACE DRAINAGE SYSTEM AND THE SITE SHALL BE DRYAND BEFORE POURING OF CONCRETE
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 3 KG/CM²

0	ISSUED FOR APPROVAL	DSC	JUNE 2015
No.	REVISION	DRW.	DATE

Inner Foundation Coordinates & Levels

a - X=518900.084 Y=2406121.153 Z= 16.083
b - X=518901.101 Y=2406120.734 Z= 16.083
c - X=518903.962 Y=2406127.551 Z= 16.083
d - X=518902.950 Y=2406127.983 Z= 16.083
e - X=518901.214 Y=2406123.878 Z= 16.383
f - X=518902.240 Y=2406123.447 Z= 16.383
g - X=518902.808 Y=2406124.835 Z= 16.383
h - X=518901.794 Y=2406125.261 Z= 16.383

Outer Foundation Coordinates & Levels

a - X=518918.525 Y=2406113.413 Z= 15.183
b - X=518919.543 Y=2406112.994 Z= 15.183
c - X=518922.403 Y=2406119.811 Z= 15.183
d - X=518921.392 Y=2406120.243 Z= 15.183
e - X=518919.655 Y=2406116.138 Z= 15.483
f - X=518920.681 Y=2406115.707 Z= 15.483
g - X=518921.250 Y=2406117.095 Z= 15.483
h - X=518920.236 Y=2406117.521 Z= 15.483

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

CONSULTANT:

euro consult
يورو كونسلت للاستشارات الهندسية

P.o. Box 34433, Istanbul / Turkey
Tel. : +90 (212) 244 46 25
Fax : +90 (212) 244 46 35
http://www.euroconsult.com.tr

NAME OF PROJECT:

HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:

MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:28250 Code:11458
Tel: 01/4031888 Fax: 01/4121717

TITILE:

KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
RAMP B, IC 1 @ STA.0+775 Rt.
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-548	00	JUNE 2015	Danny	Eng'r FAREED T.M	

GANTRY FOUNDATION TABLE

QUANTITY FOR ONE FOUNDATION MULTIPLY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 50 DIA BARS
2-STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH ASSTO
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D (20N/20) -28 DAYS COMPRESSIVE STRENGTH FOR REINFORCED CONCRETE CULVERT 0=20 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE fc=15MPa (min)
4.2 REINFORCING STEEL : Fy=410 MPa
5- CONCRETE COVER:
5.1 THE SMOOTHNESS BETWEEN BRIDGE CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXING .
6.2- ALL REINFORCING STEEL SHALL BE STRENGTH, STEEL BONS, REPORMED BARS CONFORMING TO ASSETO M31 REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATION.
8-GEOTECHNICAL DATA:
8.1-IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SOIL ALLOWABLE BEARING CAPACITY IS MORE THAN 2 KG/CM²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, EXCEPTIONS EXCAVATION.
IF WATER ENCOUNTERED,THE CONTRACTOR SHALL INFORM THE ENGINEER ,SO THAT THE EMBANKMAN DRAINAGE SYSTEM AND THE SITE SHALL BE OBTAINED BEFORE POURING OF CONCRETE.
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 KG/CM²

0	ISSUED FOR APPROVAL	DSC	JUNE 2015
No.	REVISION	DRW.	DATE

Inner Foundation Coordinates & Levels

a - X=516057.936 Y=2410063.034 Z= 10.690
b - X=516056.337 Y=2410062.988 Z= 10.690
c - X=516056.632 Y=2410055.774 Z= 10.690
d - X=516058.231 Y=2410055.840 Z= 10.690
e - X=516058.053 Y=2410060.186 Z= 10.990
f - X=516056.454 Y=2410060.120 Z= 10.990
g - X=516056.516 Y=2410058.622 Z= 10.990
h - X=516058.114 Y=2410058.687 Z= 10.990

Outer Foundation Coordinates & Levels

a - X=516029.961 Y=2410061.900 Z= 10.190
b - X=516028.362 Y=2410061.835 Z= 10.190
c - X=516028.653 Y=2410054.641 Z= 10.190
d - X=516030.252 Y=2410054.705 Z= 10.190
e - X=516030.076 Y=2410059.052 Z= 10.490
f - X=516028.477 Y=2410058.987 Z= 10.490
g - X=516028.538 Y=2410057.488 Z= 10.490
h - X=516030.137 Y=2410057.553 Z= 10.490

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

CONSULTANT:

EURO CONSULT
يورو كونسلت للاستشارات الهندسية

P.o. Box 34433, Istanbul / Turkey
Tel. : +90 (212) 244 46 25
Fax : +90 (212) 244 46 35
http://www.euroconsult.com.tr

NAME OF PROJECT:

HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:

MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:28220 Code:11468
Tel: 01/4034888 Fax: 01/4121717

TITLE:

KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
ROAD 1 @ STA.0+500 Right
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-548	00	JUNE 2015	Danny	Eng'r FAREED T.M	

GANTRY FOUNDATION TABLE

QUANTITY FOR ONE FOUNDATION MULTIPLY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 50 Db BARS
2-STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH ASSHTO
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE:
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D (28Db/28)
-28 DAYS COMPRESSIVE STRENGTH FOR
REINFORCED CONCRETE COLUMN= 0=35 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE. 0=25MPa (min)
4.2 REINFORCING STEEL : Fy=420 MPa
5- CONCRETE COVER:
5.1 UNLESS OTHERWISE NOTED, BRIDGE CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED:
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED.
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXES .
6.2- ALL REINFORCING STEEL SHALL BE STRAIGHT, FREE FROM, DEFORMED BARS CONFORMING TO AASHTO M31 REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATION.
8-GEOTECHNICAL DATA:
8.1-IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SOIL ALLOWABLE BEARING CAPACITY IS MORE THAN 2 Kg/cm²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, BEF DURING EXCAVATION. IF WATER ENCOUNTERED THE CONTRACTOR SHALL INFORM THE ENGINEER AND THE SITE SURFACE DRAINAGE SYSTEM AND THE SITE SHALL BE OBTAINED BEFORE POURING OF CONCRETE .
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 Kg/cm²

0	ISSUED FOR APPROVAL	DSC	JUNE 2015
No.	REVISION	DRW.	DATE

Inner Foundation Coordinates & Levels

a - X=516006.047 Y=2408462.321 Z= 9.149
b - X=516007.640 Y=2408462.168 Z= 9.149
c - X=516008.328 Y=2408469.335 Z= 9.149
d - X=516006.736 Y=2408469.488 Z= 9.149
e - X=516006.320 Y=2408465.158 Z= 9.449
f - X=516007.912 Y=2408465.005 Z= 9.449
g - X=516008.056 Y=2408466.498 Z= 9.449
h - X=516006.463 Y=2408466.651 Z= 9.449

Outer Foundation Coordinates & Levels

a - X=516030.813 Y=2408459.987 Z= 7.749
b - X=516032.399 Y=2408459.779 Z= 7.749
c - X=516033.333 Y=2408466.919 Z= 7.749
d - X=516031.747 Y=2408467.126 Z= 7.749
e - X=516031.183 Y=2408462.813 Z= 8.049
f - X=516032.769 Y=2408462.605 Z= 8.049
g - X=516032.964 Y=2408464.093 Z= 8.049
h - X=516031.377 Y=2408464.300 Z= 8.049

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

CONSULTANT:

euro consult
يورو كونسلت للاستشارات الهندسية
P.o. Box 34433, Istanbul / Turkey
Tel. : +90 (212) 244 46 25
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http://www.euroconsult.com.tr

NAME OF PROJECT:

HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:

MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:36250 Code:11466
Tel: 01/4091666 Fax: 01/4121717

TITLE:

KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
ROAD 1 @ STA.2+100 Left
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING

A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-548	00	JUNE 2015	Danny	Eng'r FAREED T.M	

GANTRY FOUNDATION TABLE

QUANTITY FOR ONE FOUNDATION MULTPIY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 50 DIA BARS
2-STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH ASSTO
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE:
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D (350kg/m3)
-28 DAYS COMPRESSIVE STRENGTH FOR REINFORCED CONCRETE CULVERT fc=30 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE fc=18MPa (min)
4.2 REINFORCING STEEL : Fy=410 MPa
5- CONCRETE COVER:
5.1 UNLESS OTHERWISE NOTED, 50MM CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED.
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED.
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXING .
6.2- ALL REINFORCING STEEL SHALL BE STRENGTH, HIGH BOND, DEFORMED BARS CONFORMING TO AASHTO M31 REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATIONS.
8-GEOTECHNICAL DATA:
8.1-IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE NET ALLOWABLE BEARING CAPACITY IS MORE THAN 2 DL/CM²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, BY DURING EXCAVATION. IF WATER ENCOUNTERED,THE CONTRACTOR SHALL REPORT TO THE ENGINEER, SO THAT THE DEWATERING DRAINAGE SYSTEM AND THE BYPASS SHALL BE OBTAINED BEFORE POURING OF CONCRETE
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 DL/CM²

0	ISSUED FOR APPROVAL	DSC	JUNE 2015
No.	REVISION	DRW.	DATE

Inner Foundation Coordinates & Levels

a - X=517852.794 Y=2407710.524 Z= 9.970
b - X=517853.349 Y=2407709.024 Z= 9.970
c - X=517860.102 Y=2407711.520 Z= 9.970
d - X=517859.548 Y=2407713.021 Z= 9.970
e - X=517855.468 Y=2407711.513 Z= 10.270
f - X=517856.022 Y=2407710.012 Z= 10.270
g - X=517857.429 Y=2407710.532 Z= 10.270
h - X=517856.874 Y=2407712.033 Z= 10.270

Outer Foundation Coordinates & Levels

a - X=517861.464 Y=2407687.076 Z= 8.870
b - X=517862.018 Y=2407685.575 Z= 8.870
c - X=517868.772 Y=2407688.072 Z= 8.870
d - X=517868.217 Y=2407689.572 Z= 8.870
e - X=517864.137 Y=2407688.064 Z= 9.170
f - X=517864.692 Y=2407686.563 Z= 9.170
g - X=517866.099 Y=2407687.063 Z= 9.170
h - X=517865.544 Y=2407688.584 Z= 9.170

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
وزارة النقل
MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
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NAME OF PROJECT:

HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:

MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:26250 Code:11466
Tel: 01/4631866 Fax: 01/4121717

TITLE:

KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
ROAD 2 @ STA.2+950 Right
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-546	00	JUNE 2015	Danny	Eng'r FAREED T.M	

GANTRY FOUNDATION TABLE

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

QUANTITY FOR ONE FOUNDATION MULTIPLY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 30 ØD BARS
2-STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH ASSHTO
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE:
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D (300/20)
-28 DAYS COMPRESSIVE STRENGTH FOR
REINFORCED CONCRETE CULVERT fc=35 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE. fc=15MPa (min)
4.2 REINFORCING STEEL : Fy=420 MPa
5- CONCRETE COVER:
5.1 UNDERGROUND WORK: 80mm CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED.
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm BY USE OF SUBMITTED MODEL.
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXING .
6.2- ALL REINFORCING STEEL SHALL BE STRENGTH, STEEL BARS, REINFORCED BARS CORRESPONDING TO AASHTO M31, REQUIREMENT, GRADE 60 ASTM A615.
7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATION.
8-GEOTECHNICAL DATA:
8.1- IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SOIL ALLOWABLE BEARING CAPACITY IS MORE THAN 2 KG/CM²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, ESP DURING EXCAVATION. IF WATER ENCOUNTERED,THE CONTRACTOR SHALL INFORM THE ENGINEER, SO THAT THE EXISTING DRAINAGE SYSTEM AND THE SITE SHALL BE DEWATERED BEFORE POURING OF CONCRETE.
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 KG/CM²

Inner Foundation Coordinates & Levels

a - X=519397.831 Y=2407003.271 Z= 19.123
b - X=519396.923 Y=2407004.589 Z= 19.123
c - X=519390.994 Y=2407000.503 Z= 19.123
d - X=519391.902 Y=2406999.186 Z= 19.123
e - X=519395.484 Y=2407001.654 Z= 19.423
f - X=519394.576 Y=2407002.972 Z= 19.423
g - X=519393.341 Y=2407002.120 Z= 19.423
h - X=519394.249 Y=2407000.803 Z= 19.423

Outer Foundation Coordinates & Levels

a - X=519383.076 Y=2407024.550 Z= 19.423
b - X=519382.208 Y=2407025.894 Z= 19.423
c - X=519376.160 Y=2407021.987 Z= 19.423
d - X=519377.028 Y=2407020.643 Z= 19.423
e - X=519380.682 Y=2407023.003 Z= 19.723
f - X=519379.814 Y=2407024.347 Z= 19.723
g - X=519378.554 Y=2407023.533 Z= 19.723
h - X=519379.422 Y=2407022.189 Z= 19.723

No.	REVISION	DRW.	DATE
0	ISSUED FOR APPROVAL	DSC	JUNE 2015

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KINGDOM OF SAUDI ARABIA
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NAME OF PROJECT:
HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:
MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:26250 Code:11496
Tel: 01/4031888 Fax: 01/4121717

TITTLE:
KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
ROAD 3 @ STA.1+525 Right
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING
A : APPROVED
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D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
EASC-MAS-548	00	JUNE 2015	Danny	Eng'r FAREED T.M	

GANTRY FOUNDATION TABLE

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

QUANTITY FOR ONE FOUNDATION MULTPIY BY TWO = TOTAL FOR BOTH INNER & OUTER FOUNDATION

NOTES:

1- LAP LENGTH BETWEEN BARS = 50 DIA BARS
2-STANDARD HOOKS SHOULD BE CALCULATED IN ACCORDANCE WITH ASSHTO
3- ALL DIMENSIONS ARE IN M
4- DESIGN STRESS
4.1 CONCRETE:
-STRUCTURAL CONCRETE FOR RETAINING WALL, CLASS D [320/20] -28 DAYS COMPRESSIVE STRENGTH FCB.
REINFORCED CONCRETE COLVERT fc=30 MPa.
28 DAYS COMPRESSIVE STRENGTH OF PLAIN CONCRETE fc=15MPa (min)
4.2 REINFORCING STEEL : Fy=410 MPa
5- CONCRETE COVER:
5.1 UNLESS OTHERWISE NOTED, 50MM CONCRETE COVER FOR REINFORCEMENT SHALL BE PROVIDED.
5.2 ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 20mm UNLESS OTHERWISE NOTED
6-MATERIAL:
6.1- ORDINARY PORTLAND CEMENT WILL BE USED FOR CONCRETE MIXING .
6.2- ALL REINFORCING STEEL SHALL BE STRAIGHT, EDGE BOND, REFORMED BARS CONFORMING TO AASHTO M31 REQUIREMENT, GRADE 60 ASTM A615.

7-CONSTRUCTION:
7.1-CONSTRUCTION SHALL BE IN ACCORDANCE WITH DESIGN REQUIREMENTS AND SPECIFICATION.
8-GEOTECHNICAL DATA:
8.1- IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THAT THE SET ALLOWABLE BEARING CAPACITY IS MORE THAN 2 KG/CM²
8.2- THE CONTRACTOR SHALL MONITOR THE WATER LEVEL DURING ALL STAGES OF CONSTRUCTION, ESP DURING EXCAVATION. IF WATER ENCOUNTERED,THE CONTRACTOR SHALL INFORM THE ENGINEER, AS THAT THE SUBSURFACE DRAINAGE SYSTEM AND THE SOIL SHALL BE DETAILED BEFORE POURING OF CONCRETE.
9 - TWO COATS BITUMINOUS PROTECTIVE COMPOUND OR AN APPROVED EQUIVALENT SHALL BE APPLIED TO ALL CONCRETE SURFACES IN CONTACT WITH SOIL.
10- ALLOWABLE BEARING CAPACITY = 2 KG/CM²

0	ISSUED FOR APPROVAL	DSC	JUNE 2015
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Inner Foundation Coordinates & Levels

a - X=518061.750 Y=2406093.477 Z= 12.410
b - X=518062.306 Y=2406091.978 Z= 12.410
c - X=518069.057 Y=2406094.479 Z= 12.410
d - X=518068.501 Y=2406095.979 Z= 12.410
e - X=518064.422 Y=2406094.467 Z= 12.710
f - X=518064.978 Y=2406092.967 Z= 12.710
g - X=518066.385 Y=2406093.488 Z= 12.710
h - X=518065.829 Y=2406094.988 Z= 12.710

Outer Foundation Coordinates & Levels

a - X=518071.481 Y=2406067.222 Z= 11.610
b - X=518072.037 Y=2406065.722 Z= 11.610
c - X=518078.789 Y=2406068.224 Z= 11.610
d - X=518078.232 Y=2406069.725 Z= 11.610
e - X=518074.154 Y=2406068.213 Z= 11.910
f - X=518074.710 Y=2406066.712 Z= 11.910
g - X=518076.116 Y=2406067.234 Z= 11.910
h - X=518075.560 Y=2406068.734 Z= 11.910

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA
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MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

CONSULTANT:

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NAME OF PROJECT:

HIGHWAYS TYING
KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:

MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:28220 Code:11465
Tel: 01/4631925 Fax: 01/4121717

TITLE:

KING ABDULLAH SPORT CITY
SHOP DRAWING FOR GANTRY FOUNDATION
ROAD 3 @ STA.3+150 Left
WITH COORDINATES & LEVELS

REVIEW STATUS/CODING
A : APPROVED
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D : RE-SUBMIT - NOT REVIEWED

Transmittal No.	REV. No.:	DATE:	SUBMITTED BY:	CHECKED BY:	APPROVED BY:
KASC-MAS-548	00	JUNE 2015	Danny	Eng'r FAREED T.M	

NOTES:

1. Thread upper 254, galvanize upper 305 of the anchor bolts.
2. Pile shall be class K210 concrete and placed against undisturbed material.
3. Provide bolt templates during installation of anchor bolts.
4. Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
5. Pile shall be turned 155 minimum below ground surface.
6. AASHTO standard specifications for structural supports for highway signs, Luminaires and traffic signals may be used to determine the pile depth values for the particular site conditions. The pile depth values shown in the table are based on allowable soil pressure of 6000 Pa.

POST TYPE	ϕ xx PIPE SIZE	SPLIT	BASE R. SIZE	BOLT CIRCLE	ANCHOR BOLTS	PILE DIA.	VERTICAL REINF	PILE DEPTH *
A	203	127	686 x 64	584	6 - 57	915	8 - 30 ϕ	3.35
B	254	102	686 x 64	584	6 - 57	915	8 - 30 ϕ	3.66
C	254	152	762 x 64	635	8 - 57	915P	11 - 30 ϕ	4.27
D	305	-	661 x 64	559	6 - 57	915	8 - 30 ϕ	3.66
E	305	102	762 x 64	635	8 - 57	915P	11 - 30 ϕ	3.96
F	305	152	813 x 70	686	8 - 57	915P	12 - 30 ϕ	3.96
G	356	-	686 x 64	584	6 - 57	915	8 - 30 ϕ	3.96
H	356	102	813 x 70	686	8 - 57	915P	12 - 30 ϕ	4.27
J	356	203	915 Dia x 70	737	10 - 57	915P	15 - 30 ϕ	5.18
K	406	-	762 x 64	635	8 - 57	915P	11 - 30 ϕ	4.27
L	406	102	915 Dia x 70	737	10 - 57	915P	15 - 30 ϕ	4.57
M	406	203	1016 Dia x 76	838	12 - 64	1067P	18 - 30 ϕ	7.32
N	457	-	813 x 70	686	8 - 57	915P	12 - 30 ϕ	5.18
O	457	127	1016 Dia x 76	838	12 - 64	1067P	18 - 30 ϕ	5.79
P	457	203	1016 Dia x 76	838	12 - 64	1067P	18 - 30 ϕ	6.71
R	508	-	915 Dia x 70	737	10 - 57	915P	15 - 30 ϕ	5.79
S	508	127	1016 Dia x 76	838	12 - 64	1067P	18 - 30 ϕ	6.71
T	610	-	1016 Dia x 76	838	12 - 64	1067P	18 - 30 ϕ	6.71
V	610	127	1067 Dia x 64	908	14 - 64	1067P	26 - 30 ϕ	6.71

NOTE: P denotes pedestal
xx = extra strong

PEDESTAL/CIDH PILE FOUNDATION DETAILS
(CIDH Denotes cast in drilled hole)

KINGDOM OF SAUDI ARABIA
MINISTRY OF COMMUNICATIONS

OVERHEAD SIGNS
TUBULAR
FOUNDATION DETAILS

DRAWING NUMBER	DATE
SS-1K	Rabi-I, 1405

SER. NO.	GANTRY SIGN NO.	LOCATION	SIDE	STATION
1	7	HARAMAIN ROAD & RAMP B (ID#1)	Right	105+618.333
2	68	HARAMAIN ROAD & SERVICE ROAD	Left	108+100.000
3	66	HARAMAIN ROAD	Right	108+700.000
4	55	HARAMAIN ROAD	Left	111+450.000
5	5	RAMP B & SERVICE ROAD 1 (ID#1)	Right	0+775.000
6	50	ROAD 2	Right	0+500.000
7	49	ROAD 1 & RAMP B (ID#2)	Left	2+100.000
8	40	ROAD 3	Right	2+950.000
9	8	ROAD 3 & RAMP C (ID #1)	Right	1+525.000
10	20	ROAD 3	Left	3+150.000

NOTES

1–ALL DIMENSIONS ARE IN METERS

Rev.	Title	DRW.	DATE
1	ISSUED FOR APPROVAL	JAMEL	Jan. 20, 2015
0	ISSUED FOR APPROVAL	ALI B.L/JAMEL /CHEKIAN	Jan. 10, 2015

المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA

MINISTRY OF TRANSPORT
ادارة الدراسات والتصميم
STUDY AND DESIGN DEPARTMENT

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KING ABDULLAH SPORT CITY
IN JEDDAH & RELEVANT JUNCTIONS

CONTRACTOR:
MASCO
MOH. A. AL-SWAILEM CO.
For Trading and Contracting
H.O: RIYADH PO Box:35250 Code:11488
Tel: 01/4031886 Fax: 01/4121717

TITILE:
KING ABDULLAH SPORT CITY
GANTRY SIGN
LIST OF SHOP DRAWING

REVIEW STATUS/CODING
A : APPROVED
B : APPROVED WITH CORRECTIONS
C : REVISE & RESUBMIT
D : RE-SUBMIT - NOT REVIEWED

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Page No. ____

CIRCULAR CURVE
P.I. NO. = 13
RADIUS= 250 m.
DESIGN SPEED = 80 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.06

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.50} = 39.00$

$X = \frac{0.015 \times L}{e} = 9.750$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.50

S.E. = -0.09

CIRCULAR CURVE
P.I. NO. = 14
RADIUS= 1000 m.
DESIGN SPEED = 80 kph

LEFT HAND SIDE

S.E= 0.0325

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.033 \times 6.5}{0.50} = 21.13$

$X = \frac{0.015 \times L}{e} = 9.750$

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.79

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

CIRCULAR CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E. = 0.23

S.E= -0.0600

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SUPER ELEVATION DIAGRAM

SPIRAL CURVE
P.I. NO. = 56
RADIUS= 60 m.
DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.32

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

LSL = 100.000
LST = 100.000

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

S.E. = 0.42

LSL = 100.000
LST = 100.000

Page No. _____

SPIRAL CURVE
P.I. NO. = 57
RADIUS= 50 m.
DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 76

RADIUS= 80 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.20

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x / 0.060 Trailing

LSL = 100.000

LST =

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

S.E. = 0.23

LSL =

LST = 100.000

SPIRAL CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

A = 0.015 x / -0.060 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.32

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

SPIRAL CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

S.E. = 0.42

LEFT HAND SIDE

S.E= 0.0600

S.E= 0.0600

LSL = 100

LST = 100

$A = \frac{0.015 \times 100.000}{0.060} = 25.000$ Leading

$A = \frac{0.015 \times 100.000}{0.060} = 25.000$ Trailing

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.79

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

S.E. = 0.23

LSL = 100.000

LST = 100.000

Page No. _____

SPIRAL CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

$A = \frac{0.015 \times 100.000}{-0.060} = 25.000$ Leading

$A = \frac{0.015 \times 100.000}{-0.060} = 25.000$ Trailing

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.32

L =

A = 0.015 x 100.000 =25.000

= -0.060 Leading

A = 0.015 x 75.000 =18.750 LSL = 100

X = -0.060 Trailing LST = 75

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. ____

CIRCULAR CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

S.E. = 0.42

LEFT HAND SIDE

S.E= 0.0600

L = 50 x e / r w

= 50 x 0.060 / 0.59 x 6.5 = 33.05

X = 0.015 x L / e = 8.263

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.79

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

LSL = 100.000

LST = 100.000

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

S.E. = 0.23

Page No. _____

CIRCULAR CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

L = 50 x e / r w

= 50 x 0.060 / 0.59 x 6.5 = 33.05

X = 0.015 x L / e = 8.263

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. 5

RADIUS 5000

DESIGN SPEED = 80 kph

RUN OFF SLOPE PERCENT r = 0.50

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

Page No. _____

RIGHT HAND SIDE

S.E= -0.060

LSL= 100

LST= 100

A = 0.015 X 100 / -0.060 = 25.000 LEADING

A = 0.015 X 100 / -0.060 = 25.000 TRAILING

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. _____

RADIUS _____

DESIGN SPEED = 80 kph

RUN OFF SLOPE PERCENT r = 0.50

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

Page No. _____

LEFT HAND SIDE

S.E= 0.060

LSL= 100

LST= 100

$$A = \frac{0.015 \times 100}{0.060} = 25.000 \quad \text{LEADING}$$

$$A = \frac{0.015 \times 100}{0.060} = 25.000 \quad \text{TRAILING}$$

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. _____

RADIUS _____

DESIGN SPEED = 40 kph

RUN OFF SLOPE PERCENT r = 0.74

طريق حرس الحدود بالمعبر السعودى

Road R-1

Page No. _____

RIGHT HAND SIDE

S.E= -0.033

$L = \frac{50 \quad e \quad w}{r}$

$= \frac{50 \quad 6.5 \quad e}{0.74} = 14.29$

$X = \frac{0.015 \times L}{e} = 6.59$

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. _____

RADIUS _____

DESIGN SPEED = 40 kph

RUN OFF SLOPE PERCENT r = 0.74

طريق حرس الحدود بالمعبر السعودي

Road R-3

Page No. _____

LEFT HAND SIDE

S.E= 0.049

$$L = \frac{50 \quad e \quad w}{r}$$

$$= \frac{50 \quad 6.5 \quad e}{0.74} = 21.30$$

$$X = \frac{0.015 \times L}{e} = 6.59$$

SUPER ELEVATION DIAGRAM

Super Elevation Runoff Slopes	
Design Speed (Km/h)	Runoff Slope Percent "r"
40	0.74
50	0.66
60	0.59
70	0.54
80	0.50
90	0.47
100	0.44
110	0.41
120	0.38
130	0.36
140	0.34

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

SPIRAL CURVE

FORMULAE FOR SPIRAL CURVE

A= 0.015 Ls / e

B= Ls - A

Where,

Ls= Length of Spiral

e= Full Superelevation

FORMULAE FOR CIRCULAR CURVE

L= 50 e w / r

Where, L= Min. Superelevation Runoff

e= Rate of Superelevation

w= Width of Traveled Way

r= Percentage of Runoff Slope

SUPER ELEVATION TABLE

RADIUS (m)	SUPER ELEVATION (%)										
	For following Design Speeds (Km/h)										
	40	50	60	70	80	90	100	110	120	130	140
55	6.00										
60	5.80										
70	5.55										
80	5.35										
90	5.05	6.00									
100	4.85	5.80									
135	4.40	5.20	6.00								
150	4.10	5.00	5.80								
185	3.70	4.60	5.30	6.00							
200	3.60	4.50	5.20	5.80							
250	3.20	4.05	4.75	5.40	6.00						
300	2.85	3.70	4.40	5.05	5.65						
335	2.60	3.50	4.20	4.85	5.40	6.00					
350	2.55	3.40	4.10	4.75	5.35	5.90					
400	2.30	3.15	3.80	4.50	5.05	5.65					
435	2.15	2.95	3.65	4.35	4.90	5.45	6.00				
450	2.07	2.90	3.60	4.25	4.80	5.40	5.95				
500	1.85	2.70	3.40	4.05	4.60	5.20	5.75				
560	1.65	2.50	3.15	3.85	4.40	4.95	5.45	6.00			
600	1.55	2.35	3.05	3.70	4.25	4.80	5.30	5.80			
620	1.50	2.30	2.95	3.65	4.20	4.70	5.25	5.75			
700	1.50	2.05	2.75	3.40	3.95	4.50	5.00	5.50	6.00		
740	1.50	2.95	2.60	3.30	3.80	4.35	4.90	5.20	5.85		
800		1.80	2.45	3.20	3.65	4.20	4.70	5.20	5.70		
875		1.65	2.30	3.00	3.55	4.00	4.55	5.00	5.50	6.00	
900		1.55	2.20	2.95	3.40	3.95	4.40	4.95	5.40	5.90	
940		1.50	2.15	2.85	3.35	3.85	4.35	4.80	5.30	5.85	
1000		1.50	2.00	2.75	3.25	3.75	4.20	4.70	5.20	5.65	
1100		1.50	1.80	2.55	3.05	3.55	4.00	4.50	4.95	5.40	6.00
1300			1.50	2.25	2.70	3.20	3.65	4.10	4.55	5.05	5.60
1500			1.50	1.95	2.45	2.90	3.35	3.80	4.25	4.70	5.20
1600			1.50	1.80	2.30	2.75	3.20	3.65	4.10	4.55	5.05
1900	NORMAL CROWN			1.50	1.95	2.40	2.80	3.25	3.70	4.10	4.60
2000				1.50	1.85	2.30	2.70	3.15	3.60	4.00	4.50
2100				1.50	1.75	2.20	2.60	3.05	3.45	3.85	4.35
2400					1.50	1.90	2.30	2.75	3.15	3.55	4.00
2500					1.50	1.85	2.25	2.65	3.05	3.45	3.90
2600					1.50	1.75	2.15	2.55	2.95	3.35	3.80
2950						1.50	1.85	2.25	2.65	3.05	3.40
3000						1.50	1.80	2.20	2.60	3.00	3.45
3200						1.50	1.70	2.10	2.50	2.85	3.30
3500							1.50	1.85	2.25	2.60	3.05
3800							1.50	1.70	2.10	2.40	2.80
4000								1.55	1.95	2.30	2.70
4150								1.50	1.90	2.20	2.60
4400								1.50	1.75	2.10	2.45
4500									1.70	2.05	2.40
4900									1.50	1.80	2.20
5000									1.50	1.75	2.15
5200									1.50	1.65	2.00
5600										1.50	1.85
6000										1.50	1.65
6400											1.50
6800											1.50

S.E = 6.00%

Normal Crown

KARA AL RABWA AL- HAIT

P.I.No	TS	SC/B.C.C.	CS/E.C.C	ST.	SIDE	R	SE	REMARKS

SPIRAL CURVE

P.I. NO. 5

RADIUS 5000

DESIGN SPEED = 80 kph

RUN OFF SLOPE PERCENT r = 0.50

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

Page No. _____

S.E. = -0.13

RIGHT HAND SIDE

S.E= -0.060

LSL= 100

LST= 100

A = 0.015 X 100 / -0.060 = 25.000 LEADING

A = 0.015 X 100 / -0.060 = 25.000 TRAILING

SUPER ELEVATION DIAGRAM

super elevation f

SPIRAL CURVE

P.I. NO. _____

RADIUS 250

DESIGN SPEED = 80 kph

RUN OFF SLOPE PERCENT r = 0.50

SHOMRUKH MASHOOQA LINK ROAD

S.E. = 0.06

GROUP NO. 4

Page No. _____

LEFT HAND SIDE

S.E= 0.060

LSL= 100

LST= 100

$A = \frac{0.015 \times 100}{0.060} = 25.000$ LEADING

$A = \frac{0.015 \times 100}{0.060} = 25.000$ TRAILING

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. _____

RADIUS 250

DESIGN SPEED = 80 kph

RUN OFF SLOPE PERCENT r = 0.50

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

Page No. _____

S.E. = 0.06

RIGHT HAND SIDE

S.E= -0.060

$L = \frac{50 \quad e \quad w}{r}$

$= \frac{50 \quad 6.5 \quad e}{0.50} = 39.00$

$X = \frac{0.015 \times L}{e} = 9.75$

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. _____

RADIUS 250

DESIGN SPEED = 80 kph

RUN OFF SLOPE PERCENT r = 0.50

SHOMRUKH MASHOOQA LINK ROAD

S.E. = 0.06

GROUP NO. 4

Page No. _____

LEFT HAND SIDE

S.E= 0.060

$$L = \frac{50 \quad e \quad w}{r}$$

$$= \frac{50 \quad 6.5 \quad e}{0.50} = 39.00$$

$$X = \frac{0.015 \times L}{e} = 9.75$$

SUPER ELEVATION DIAGRAM

Super Elevation Runoff Slopes	
Design Speed (Km/h)	Runoff Slope Percent "r"
40	0.74
50	0.66
60	0.59
70	0.54
80	0.50
90	0.47
100	0.44
110	0.41
120	0.38
130	0.36
140	0.34

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

SPIRAL CURVE

FORMULAE FOR SPIRAL CURVE

A= 0.015 Ls / e

B= Ls - A

Where,

Ls= Length of Spiral

e= Full Superelevation

FORMULAE FOR CIRCULAR CURVE

L= 50 e w / r

Where, L= Min. Superelevation Runoff

e= Rate of Superelevation

w= Width of Traveled Way

r= Percentage of Runoff Slope

The minimum allowable radius for any design speed can be computed using the following equation.

$$R = \frac{V^2}{127\,(e+f)}$$

where :

R = Minimum radius of circular curve in meters

V = Vehicle speed in kilometers per hour

e = Maximum superelevation rate in meters per meter

f = Side friction factor

Maximum Safe Side Friction Factors

Design Speed (km/hr)	Side Friction Factor
40	0.17
50	0.16
60	0.15
70	0.15
80	0.14
90	0.13
100	0.12
110	0.11
120	0.10
130	0.09
140	0.08

Minimum Radii for Superelevated Curves

Design Speed	Maximum Superelevation Rate (m/m)			
(km/hr)	0.06	0.08	0.10	0.12
40	55	50	45	45
50	90	85	75	70
60	135	125	115	105
70	185	170	155	145
80	250	230	210	195
90	335	305	280	255
100	440	395	360	330
110	560	500	455	415
120	710	630	565	515
130	885	785	700	635
140	1100	965	860	770

How to find Radius

$$\mathbf{R = \frac{V^2}{127\,(e+f)}}$$

Given:

V= 40

e= 0.06

f= 0.17

R = 55

How to find Superelevation

$$\mathbf{e = \frac{V^2}{127 \times R} - f}$$

Given:

V= 80

R= 195

f= 0.14

e = 0.12

Maximum Superelevation Rates

Highway Design Class	Desirable Maximum S.E. Rate	Absolute Maximum S.E. Rate
Expressway	0.08	0.10
Arterial	0.08	0.10
Collector	0.08	0.12
Local	0.10	0.12

SUPER ELEVATION TABLE

RADIUS (m)	SUPER ELEVATION (%) For following Design Speeds (Km/h)										
	40	50	60	70	80	90	100	110	120	130	140
55	6.00										
60	5.80										
70	5.55										
80	5.35										
90	5.05	6.00									
100	4.85	5.80									
135	4.40	5.20	6.00								
150	4.10	5.00	5.80								
185	3.70	4.60	5.30	6.00							
200	3.60	4.50	5.20	5.80							
250	3.20	4.05	4.75	5.40	6.00						
300	2.85	3.70	4.40	5.05	5.65						
335	2.60	3.50	4.20	4.85	5.40	6.00					
350	2.55	3.40	4.10	4.75	5.35	5.90					
400	2.30	3.15	3.80	4.50	5.05	5.65					
435	2.15	2.95	3.65	4.35	4.90	5.45	6.00				
450	2.07	2.90	3.60	4.25	4.80	5.40	5.95				
500	1.85	2.70	3.40	4.05	4.60	5.20	5.75				
560	1.65	2.50	3.15	3.85	4.40	4.95	5.45	6.00			
600	1.55	2.35	3.05	3.70	4.25	4.80	5.30	5.80			
620	1.50	2.30	2.95	3.65	4.20	4.70	5.25	5.75			
700	1.50	2.05	2.75	3.40	3.95	4.50	5.00	5.50	6.00		
740	1.50	2.95	2.60	3.30	3.80	4.35	4.90	5.20	5.85		
800		1.80	2.45	3.20	3.65	4.20	4.70	5.20	5.70		
875		1.65	2.30	3.00	3.55	4.00	4.55	5.00	5.50	6.00	
900		1.55	2.20	2.95	3.40	3.95	4.40	4.95	5.40	5.90	
940		1.50	2.15	2.85	3.35	3.85	4.35	4.80	5.30	5.85	
1000		1.50	2.00	2.75	3.25	3.75	4.20	4.70	5.20	5.65	
1100		1.50	1.80	2.55	3.05	3.55	4.00	4.50	4.95	5.40	6.00
1300			1.50	2.25	2.70	3.20	3.65	4.10	4.55	5.05	5.60
1500			1.50	1.95	2.45	2.90	3.35	3.80	4.25	4.70	5.20
1600			1.50	1.80	2.30	2.75	3.20	3.65	4.10	4.55	5.05
1900	NORMAL CROWN			1.50	1.95	2.40	2.80	3.25	3.70	4.10	4.60
2000				1.50	1.85	2.30	2.70	3.15	3.60	4.00	4.50
2100				1.50	1.75	2.20	2.60	3.05	3.45	3.85	4.35
2400					1.50	1.90	2.30	2.75	3.15	3.55	4.00
2500					1.50	1.85	2.25	2.65	3.05	3.45	3.90
2600					1.50	1.75	2.15	2.55	2.95	3.35	3.80
2950						1.50	1.85	2.25	2.65	3.05	3.40
3000						1.50	1.80	2.20	2.60	3.00	3.45
3200						1.50	1.70	2.10	2.50	2.85	3.30
3500							1.50	1.85	2.25	2.60	3.05
3800							1.50	1.70	2.10	2.40	2.80
4000								1.55	1.95	2.30	2.70
4150								1.50	1.90	2.20	2.60
4400								1.50	1.75	2.10	2.45
4500									1.70	2.05	2.40
4900									1.50	1.80	2.20
5000									1.50	1.75	2.15
5200									1.50	1.65	2.00
5600										1.50	1.85
6000										1.50	1.65
6400											1.50
6800											1.50

S.E = 6.00%

Normal Crown

KARA AL RABWA AL- HAIT

P.I.No	TS	SC/B.C.C.	CS/E.C.C	ST.	SIDE	R	SE	REMARKS

CIRCULAR CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

CIRCULAR CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SUPER ELEVATION DIAGRAM

SUPER2-

Page No. ____

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

CIRCULAR CURVE
P.I. NO. = 56
RADIUS= 60 m.
DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

CIRCULAR CURVE
P.I. NO. = 57
RADIUS= 50 m.
DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

CIRCULAR CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. ____

CIRCULAR CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

LSL = 100

LST = 100

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

SPIRAL CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

LSL = 100

LST = 100

SUPER ELEVATION DIAGRAM

SPIRAL CURVE
P.I. NO. = 56
RADIUS= 60 m.
DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

LSL = 100
LST = 100

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

SPIRAL CURVE
P.I. NO. = 57
RADIUS= 50 m.
DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

LSL = 100
LST = 100

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 76

RADIUS= 80 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

LSL = 100

LST = 100

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. ____

SPIRAL CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

LSL = 100

LST = 100

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

SUPER ELEVATION DIAGRAM

SPIRAL CURVE
P.I. NO. = 76
RADIUS= 100 m.
DESIGN SPEED = 80 kph

LEFT HAND SIDE

S.E= 0.060

LSL = 100
LST = 100

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.50

Page No. ____

SPIRAL CURVE
P.I. NO. = 77
RADIUS= 75 m.
DESIGN SPEED = 80 kph

RIGHT HAND SIDE

S.E= -0.060

LSL = 100
LST = 100

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

SPIRAL CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

LSL = 100

LST = 100

S.E= 0.060

S.E= 0.060

$A = \frac{0.015 \times 100.000}{0.060} = 25.000$ Leading

$A = \frac{0.015 \times 100.000}{0.060} = 25.000$ Trailing

SUPER ELEVATION DIAGRAM

Page No. _____

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

LSL = 100

LST = 100

CIRCULAR CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

$L = \frac{50 \times e}{r} \times w$

$= \frac{50 \times 0.060}{0.59} \times 6.5 = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SPIRAL CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

S.E= 0.060

$A = \frac{0.015 \times 100.000}{0.060} = 25.000$ Leading

$A = \frac{0.015 \times 100.000}{0.060} = 25.000$ Trailing

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

L =

A = 0.015 x 100.000 / -0.060 =25.000 Leading

=

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

X =

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

LSL = 100

LST = 100

Page No. _____

CIRCULAR CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

L = 50 x e / r w

= 50 x 0.060 / 0.59 x 6.5 = 33.05

X = 0.015 x L / e = 8.263

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

L =

A = 0.015 x 100.000 / -0.060 =25.000 Leading

=

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

X =

LSL = 100

LST = 100

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. _____

CIRCULAR CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

L = 50 x e / r w

= 50 x 0.060 / 0.59 x 6.5 = 33.05

X = 0.015 x L / e = 8.263

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

LSL = 100

LST = 100

Page No. ____

SPIRAL CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

$A = \frac{0.015 \times 100.000}{-0.060} = 25.000$ Leading

$A = \frac{0.015 \times 100.000}{-0.060} = 25.000$ Trailing

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 76

RADIUS= 100 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.060 \times 6.5}{0.59} = 33.05$

$X = \frac{0.015 \times L}{e} = 8.263$

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

LSL = 100

LST = 100

Page No. ____

SPIRAL CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

$A = \frac{0.015 \times 100.000}{-0.060} = 25.000$ Leading

$A = \frac{0.015 \times 100.000}{-0.060} = 25.000$ Trailing

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

LSL = 100

LST = 100

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

Page No. ____

CIRCULAR CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

L = 50 x e / r w

= 50 x 0.060 / 0.59 x 6.5 = 33.05

X = 0.015 x L / e = 8.263

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 76

RADIUS= 100 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.060

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

SHOMRUKH MASHOOQA LINK ROAD

GROUP NO. 4

RUN OFF SLOPE PERCENT r = 0.59

LSL = 100

LST = 100

Page No. ____

CIRCULAR CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.060

L = 50 x e / r w

= 50 x 0.060 / 0.59 x 6.5 = 33.05

X = 0.015 x L / e = 8.263

SUPER ELEVATION DIAGRAM

SUPERELEV-DOUBLE

CIRCULAR CURVE

P.I. NO. = 141

RADIUS= 50 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.42

L = 50 x e / r w

= 50 x 0.100 / 0.59 x 6.5 = 55.08

X = 0.015 x L / S.E. = 13.77

SHOMRUKH MASHOOQA LINK ROAD

LOCAL

ROAD WIDTH = 6.50 - (two sides)

RHS → BCC = 12+654.022

ECC = 12+687.176

BCC = 12+725.483

ECC = 12+761.081 ← LHS

RUN OFF SLOPE PERCENT r = 0.59

Page No. 1

CIRCULAR CURVE

P.I. NO. = 142

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.79

L = 50 x e / r w

= 50 x 0.100 / 0.59 x 6.5 = 55.08

X = 0.015 x L / S.E = 13.77

SUPER ELEVATION DIAGRAM

SHOMRUKH MASHOOQA LINK ROAD

LOCAL

ROAD WIDTH = 6.50 - (two sides)

LHS → BCC = 10+300.000
ECC = 10+400.000
BCC = 10+500.000
ECC = 10+600.000 ← RHS

RUN OFF SLOPE PERCENT r = 0.59

CIRCULAR CURVE
P.I. NO. = 76
RADIUS= 30 m.
DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.79

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.100 \times 6.5}{0.59} = 55.08$

$X = \frac{0.015 \times L}{S.E} = 13.77$

CIRCULAR CURVE
P.I. NO. = 77
RADIUS= 75 m.
DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.23

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.100 \times 6.5}{0.59} = 55.08$

$X = \frac{0.015 \times L}{S.E} = 13.77$

SUPER ELEVATION DIAGRAM

SHOMRUKH MASHOOQA LINK ROAD

SPIRAL CURVE
P.I. NO. = 56
RADIUS= 60 m.
DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.32

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

LSL = 100.000
LST = 100.000

L-LEADING
TS: 5+300.000
CS: 5+400.000
CS: 6+400.000 L-TRAILING
TS: 6+500.000
R-LEADING
TS: 6+600.000
CS: 6+700.000
CS: 7+400.000 R-TRAILING
TS: 7+500.000

RUN OFF SLOPE PERCENT r = 0.59

S.E. = 0.42

LSL = 100.000
LST = 100.000

SPIRAL CURVE
P.I. NO. = 57
RADIUS= 50 m.
DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

SUPER ELEVATION DIAGRAM

SHOMRUKH MASHOOQA LINK ROAD

SPIRAL CURVE
P.I. NO. = 76
RADIUS= 80 m.
DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600 **S.E. = 0.20**

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

LSL = 100.000
LST = 100.000

RUN OFF SLOPE PERCENT r = 0.59

L-LEADING
TS= 5+300.000
CS= 5+400.000
CS= 6+400.000 L-TRAILING
TS= 6+500.000
R-LEADING
TS= 6+600.000
CS= 6+700.000
CS= 7+400.000 R-TRAILING
TS= 7+500.000

S.E. = 0.23

LSL = 100.000
LST = 100.000

SPIRAL CURVE
P.I. NO. = 77
RADIUS= 75 m.
DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.32

$L = \frac{50 \times e \quad w}{r}$

$= \frac{50 \times 0.100 \times 6.5}{0.59} = 55.08$

$X = \frac{0.015 \times L}{S.E} = 13.77$

SHOMRUKH MASHOOQA LINK ROAD

Page No. 5

LOCAL

ROAD WIDTH = 6.50 - (two sides)

BCC = 8+700.000

ECC = 8+800.000

R-LEADING

TS= 8+900.000

CS= 9+000.000

CS= 9+100.000

TS= 9+200.000

R-TRAILING

RUN OFF SLOPE PERCENT r = 0.59

S.E. = 0.42

LSL = 100

LST = 100

SPIRAL CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

$A = \frac{0.015 \times 100.000}{0.060} = 25.000$ Leading

$A = \frac{0.015 \times 100.000}{0.060} = 25.000$ Trailing

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.79

L = 50 x e / r w

= 50 x 0.100 / 0.59 x 6.5 = 55.08

X = 0.015 x L / S.E = 13.77

RUN OFF SLOPE PERCENT r = 0.59

SHOMRUKH MASHOOQA LINK ROAD

Page No. 6

LOCAL

ROAD WIDTH = 6.50 - (two sides)

BCC = 10+300.000

ECC = 10+400.000

R-LEADING

TS: 10+500.000

CS 10+600.000

CS 10+700.000

TS: 10+800.000

R-TRAILING

LSL = 100.000

LST = 100.000

S.E. = 0.23

SPIRAL CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 56

RADIUS= 60 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.32

L =

A = 0.015 x 100.000 =25.000

= -0.060 Leading

A = 0.015 x 100.000 =25.000

X = -0.060 Trailing

SHOMRUKH MASHOOQA LINK ROAD

Page No. 7

LOCAL

L-LEADING

TS= 8+750.000

CS= 8+850.000

CS= 8+900.000

TS= 9+000.000

L-TRAILING

ROAD WIDTH = 6.50 - (two sides)

BCC = 9+200.000

ECC = 9+400.000

RUN OFF SLOPE PERCENT r = 0.59

LSL = 100

LST = 100

CIRCULAR CURVE

P.I. NO. = 57

RADIUS= 50 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E. = 0.42

S.E= 0.0600

L = 50 x e / r w

= 50 x 0.100 / 0.59 x 6.5 = 55.08

X = 0.015 x L / S.E = 13.77

SUPER ELEVATION DIAGRAM

SPIRAL CURVE

P.I. NO. = 76

RADIUS= 30 m.

DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.79

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

LSL = 100.000

LST = 100.000

RUN OFF SLOPE PERCENT r = 0.59

SHOMRUKH MASHOOQA LINK ROAD

Page No. 8

LOCAL

L-LEADING

TS= 9+200.000

CS= 9+300.000

CS= 9+600.000

TS= 9+700.000

L-TRAILING

ROAD WIDTH = 6.50 - (two sides)

BCC = 9+800.000

ECC = 10+480.000

S.E. = 0.23

CIRCULAR CURVE

P.I. NO. = 77

RADIUS= 75 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

L = 50 x e / r w

= 50 x 0.100 / 0.59 x 6.5 = 55.08

X = 0.015 x L / S.E = 13.77

SUPER ELEVATION DIAGRAM

CIRCULAR CURVE

P.I. NO. = 1

RADIUS= 150 m.

DESIGN SPEED = 60 kph

RIGHT HAND SIDE

S.E= -0.0600

S.E. = 0.04

L = 50 x e / r w

= 50 x 0.100 / 0.59 x 7.5 = 63.56

X = 0.015 x L / S.E = 15.89

mozah. University road no. mr2-04

LOCAL

ROAD WIDTH = 7.50 - (two sides)

RHS1

BCC = 0+000.000

ECC = 0+138.750

BCC = 0+630.640

ECC = 0+662.080

RHS2

RUN OFF SLOPE PERCENT r = 0.59

Page No. 1

CIRCULAR CURVE

P.I. NO. = 2

RADIUS= 200 m.

DESIGN SPEED = 60 kph

S.E. = -0.01

RIGHT HAND SIDE

S.E= -0.0600

L = 50 x e / r w

= 50 x 0.100 / 0.59 x 7.5 = 63.56

X = 0.015 x L / S.E = 15.89

SUPER ELEVATION DIAGRAM

SHOMRUKH MASHOOQA LINK ROAD

LOCAL

ROAD WIDTH = 6.50 - (two sides)

LHS1 → BCC = 5+400.000
ECC = 5+500.000
BCC = 6+500.000
ECC = 6+600.000 ← LHS2

RUN OFF SLOPE PERCENT r = 0.50

CIRCULAR CURVE
P.I. NO. = 13
RADIUS= 250 m.
DESIGN SPEED = 80 kph

LEFT HAND SIDE

S.E= 0.0600

S.E. = 0.06

L = 50 x e / r w

= 50 x 0.100 / 0.50 x 6.5 = 65.00

X = 0.015 x L / S.E = 16.25

CIRCULAR CURVE
P.I. NO. = 14
RADIUS= 200 m.
DESIGN SPEED = 80 kph

S.E. = 0.11

LEFT HAND SIDE

S.E= 0.0600

L = 50 x e / r w

= 50 x 0.100 / 0.50 x 6.5 = 65.00

X = 0.015 x L / S.E = 16.25

SUPER ELEVATION DIAGRAM

SPIRAL CURVE
P.I. NO. =
RADIUS= 60 m.
DESIGN SPEED = 80 kph

RIGHT HAND SIDE

S.E= -0.0600

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

S.E. = 0.70

LSL = 100.000
LST = 100.000

SHOMRUKH MASHOOQA LINK ROAD

L-LEADING	TS=	5+300.000
	CS=	5+400.000
	CS=	6+400.000
	TS=	6+500.000
R-LEADING	TS=	6+600.000
	CS=	6+700.000
	CS=	7+400.000
	TS=	7+500.000

L-TRAILING

R-TRAILING

RUN OFF SLOPE PERCENT r = 0.50

S.E. = 0.87

LSL = 100.000
LST = 100.000

SPIRAL CURVE
P.I. NO. =
RADIUS= 50 m.
DESIGN SPEED = 80 kph

RIGHT HAND SIDE

S.E= -0.0600

A = 0.015 x 100.000 / -0.060 =25.000 Leading

A = 0.015 x 100.000 / -0.060 =25.000 Trailing

Page No.

SUPER ELEVATION DIAGRAM

Page No. _____

SHOMRUKH MASHOOQA LINK ROAD

SPIRAL CURVE
P.I. NO. = _____
RADIUS= 60 m.
DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

LSL = 100.000
LST = 100.000

S.E. = 0.32

L-LEADING	TS=	5+300.000
	CS=	5+400.000
	CS=	6+400.000
	TS=	6+500.000
R-LEADING	TS=	6+600.000
	CS=	6+700.000
	CS=	7+400.000
	TS=	7+500.000

L-TRAILING

R-TRAILING

RUN OFF SLOPE PERCENT r = 0.59

S.E. = 0.42

LSL = 100.000
LST = 100.000

SPIRAL CURVE
P.I. NO. = _____
RADIUS= 50 m.
DESIGN SPEED = 60 kph

LEFT HAND SIDE

S.E= 0.0600

A = 0.015 x 100.000 / 0.060 =25.000 Leading

A = 0.015 x 100.000 / 0.060 =25.000 Trailing

SUPER ELEVATION DIAGRAM

Survey

القسم خاص برنامج مساحه , وتحويل الأحداثيات منقول

Zone 39
Zone 38
Zone 37
Zone 39
Zone 38
Zone 37

Select Datum

WGS 84
NAD 83
GRS 80
WGS 72
Australian 1965
Krasovsky 1940
North American 1927
International 1924
Hayford 1909
Clarke 1880
Clarke 1866
Airy 1830
Bessel 1841
Everest 1830

About Accuracy

Conditions of Use

How to Use This Spreadsheet

Selection #	Datum	a	b	f	1/f
1	WGS 84	6,378,137.0	6,356,752.3	0.003353	298.257

By Steve Dutch
University of Wisconsin-Green Bay

Updated 19 April 2005

Convert Latitude and Longitude to UTM (Choose Decimal or DD MM SS)

	N/S - E/W	Decimal		DD	MM	SS	
Latitude	S			36	52	31	
Longitude	W			4	5	16	
Latitude		-36.87527778	36	52	31	S	
Longitude		-4.087777778	4	5	16	W	

Easting	403,054.31	Zone	30 H
Northing	5,918,410.98	Zone CM	-3
Military Grid Reference	30 H VE	03054	18410

Convert UTM TO Latitude and Longitude

Easting	781,496.00			
Northing	2,900,000.00	North or South Latitude?	N	
Zone	10	Zone Central Longitude	-123	W

	Decimal	DD	MM	SS	
Latitude	26.19192587	26	11	30.933	N
Longitude	-120.1833271	120	10	59.977	W

Convert Military Grid References to Latitude and Longitude

	Long Zone	Lat Zone	Digraph	Easting	Northing
	10	s	gq	81496	00000

Under Construction

	Decimal	DD	MM	SS
Latitude	26.19192587	26	11	30.933
Longitude	-120.1833271	-120	10	59.977

UTM Easting	781496
UTM Northing	2900000
Error Status	
Valid Digraph	
Valid Latitude Zone	

UTMConversions1

How to Use This Spreadsheet

Datum	WGS 84	
	Symbol	Value
Datum Constants		
Polar Axis	b	6356752.314
Equ Rad	a	6378137
ecc	e	0.081819191
e'2	e1sq	0.006739497
Scale	k0	0.9996
Calculate Footprint Latitude		
e1	0.00167922	
C1	0.002518827	
C2	3.70095E-06	
C3	7.44781E-09	
C4	1.7036E-11	
Constants for Formulas		
sin1"	sin1	4.84814E-06

North or South Latitude	Longitude Zone	Northing	Easting	Corrected Northing	East Prime	Arc Length	mu	Footprint Latitude (phi)	C1	T1	N1	R1	D	Fact1	Fact2	Fact3	Fact4	LoFact1	LoFact2	LoFact3	Delta-Long	Zone CM	Raw Latitude	Latitude	Longitude	Latitude-Degrees	Latitude-Minutes	Latitude-Seconds	Longitude-Degrees	Longitude-Minutes	Longitude-Seconds
				Coefficients fo										Coefficients for Calculating Longitude																	
N	14	7,020,000.00	300,000.00	##	##	##	1	1	0	4	##	##	0	2	0	0	0	0	0	0	0	-99	63	63.25291	-102.9848983	63	15	10.48844	-102	59	5.633751
S	45	4,041,000.00	310,000.00	##	##	##	1	1	0	1	##	##	0	1	0	0	0	0	0	0	0	87	36	-36.4955	84.87867118	-36	29	43.68732	84	52	43.21624
N	30	1,000,000.00	320,000.00	##	##	##	0	0	0	0	##	##	0	0	0	0	0	0	0	0	0	-3	9	9.042902	-4.637624184	9	2	34.44804	-4	38	15.44706
S	2	2,000,000.00	330,000.00	##	##	##	0	0	0	0	##	##	0	0	0	0	0	0	0	0	0	##	18	-18.082	-172.6064281	-18	4	55.26395	-172	36	23.14127
N	22	3,000,000.00	340,000.00	##	##	##	0	0	0	0	##	##	0	1	0	0	0	0	0	0	0	-51	27	27.11319	-52.61415006	27	6	47.47956	-52	36	50.94022
S	43	4,000,000.00	350,000.00	##	##	##	1	1	0	1	##	##	0	1	0	0	0	0	0	0	0	75	36	-36.1331	73.33295946	-36	7	59.18991	73	19	58.65407
N	32	5,000,000.00	360,000.00	##	##	##	1	1	0	1	##	##	0	1	0	0	0	0	0	0	0	9	45	45.13959	7.219365061	45	8	22.50678	7	13	9.714219
S	51	6,000,000.00	370,000.00	##	##	##	1	1	0	2	##	##	0	1	0	0	0	0	0	0	0	##	54	-54.1316	121.010359	-54	7	53.93785	121	0	37.29247
N	23	7,000,000.00	380,000.00	##	##	##	1	1	0	4	##	##	0	2	0	0	0	0	0	0	0	-45	63	63.10938	-47.37838759	63	6	33.76591	-47	22	42.19534
S	27	8,000,000.00	390,000.00	##	##	##	1	1	0	10	##	##	0	3	0	0	0	0	0	0	0	-21	72	-72.0729	-24.20318991	-72	4	22.59338	-24	12	11.48368
N	18	1,000,000.00	400,000.00	##	##	##	0	0	0	0	##	##	0	0	0	0	0	0	0	0	0	-75	9	9.045433	-75.90987953	9	2	43.5589	-75	54	35.56631
S	52	2,000,000.00	410,000.00	##	##	##	0	0	0	0	##	##	0	0	0	0	0	0	0	0	0	##	18	-18.0868	128.1494497	-18	5	12.60235	128	8	58.01882
N	37	3,000,000.00	420,000.00	##	##	##	0	0	0	0	##	##	0	1	0	0	0	0	0	0	0	39	27	27.12015	38.19282791	27	7	12.53982	38	11	34.18047
S	28	3,000,000.00	430,000.00	##	##	##	0	0	0	0	##	##	0	1	0	0	0	0	0	0	0	-15	27	-27.1207	-15.70628222	-27	7	14.49717	-15	42	22.61598
N	19	4,000,000.00	440,000.00	##	##	##	1	1	0	1	##	##	0	1	0	0	0	0	0	0	0	-69	36	36.14286	-69.66692298	36	8	34.29962	-69	40	0.922727
S	16	5,002,000.00	450,000.00	##	##	##	1	1	0	1	##	##	0	1	0	0	0	0	0	0	0	-87	45	-45.1697	-87.63627578	-45	10	10.94872	-87	38	10.59281

How to Use This Spreadsheet

Datum WGS 84

Datum Constants	Symbol	Value
equatorial radius	a	6378137
polar radius	b	6356752
flattening	f	0.003353
inverse flattening	1/f	298.2572
Mean radius	rm	6367436
scale factor	k0	0.9996
eccentricity	e	0.081819
	e'2	0.006739
	n	0.001679

Meridional Arc Constants	
A0	6367449
B0	16038.43
C0	16.83261
D0	0.021984
E0	0.000313

Calculation Constants	
Sin1"	4.85E-06

Lat DD.dddd	Long DD.ddd	Long Zone	Long Zone CM	Delta Long (Sec)	Lat Rad	Long Rad	r curv 1 = rho	r curv 2 = nu	Calculate Meridional Arc Length	Meridional Arc S	Coefficients for UTM Coordinates	Ki	Kii	Kiii	Kiv	Kv	A6	Raw Northing	Northing	Easting	Long Zone
60	-120	11	##	-1	1	-2	##	##		##		##	##	0	##	-30	-0	##	6655206	332705.2	11
30	-88	16	-87	-0	1	-2	##	##		##		##	##	2	##	53	0	##	3319206	403549.8	16
17	-22	27	-21	-0	0	-0	##	##		##		##	##	2	##	97	0	##	1879827	393552.3	27
30	77	43	75	1	1	1	##	##		##		##	##	2	##	53	0	##	3320469	692915.1	43
60	121	51	##	-1	1	2	##	##		##		##	##	0	##	-30	-0	##	6653098	388456	51
40	149	55	##	1	1	3	##	##		##		##	##	2	##	16	0	##	4429673	670725.5	55
-38	133	53	##	-1	-1	2	##	##		##		##	##	-2	##	23	-0	##	5792298	324396.6	53
-44	32	36	33	-0	-1	1	##	##		##		##	##	-2	##	3	-0	##	5127641	419825.7	36
-77	142	54	##	0	-1	2	##	##		##		##	##	0	##	-25	0	##	1453013	525110.2	54
-65	-142	7	##	-0	-1	-2	##	##		##		##	##	-0	##	-33	0	##	2791172	452844.9	7
-10	-20	27	-21	0	-0	-0	##	##		##		##	##	-1	##	##	-0	##	8894421	609600.8	27
-55	-79	17	-81	1	-1	-1	##	##		##		##	##	-1	##	-24	0	##	3903379	627928.2	17
0	3	31	3	0	0	0	##	##		0		0	0	0	##	##	0	0	0	500000	31
0	0	31	3	-1	0	0	##	##		0		0	0	0	##	##	0	0	0	166021.5	31

1 - INTERPOLATION

X1=	9	Y1=	18
X2=	27	Y2=	54
X=	17	Y=	34
X=	18.5	Y=	37
X=	18	Y=	36
X=	19	Y=	38
X=	20	Y=	40
X=	25	Y=	50
X=	35	Y=	70
X=	66	Y=	132
X=	112	Y=	224
X=	20	Y=	40
X=	25	Y=	50
X=	35	Y=	70
X=	66	Y=	132
X=	112	Y=	224
X=	20	Y=	40
X=	25	Y=	50
X=	35	Y=	70
X=	66	Y=	132
X=	112	Y=	224
X=	112	Y=	224

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5	SLOPE STAKE	**Z2**
6	INTERSECTION OF TWO LINES	**AE2**
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8	COORDINATE OF CIRCULAR CURVE	**AO2**
9	SPIRAL DATA	**AT2**

2 - AREA BY COORDINATES

No.	DIST.(X)=	ELEV.(Y)=	Xn*Yn+1	Yn*Xn+1
1	2	2	AREA=	324.000
2	20	2	4	40
3	20	20	400	40
4	2	20	400	40
5	2	2	4	40
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
			808	160

3 - AZIMUTH &DISTANCE>>
>>COORDINATES

EAST=	91329.89		
NORTH=	12649.02		
AZIMUTH=	148.1388	EAST 2=	91320.5682
DISTANCE=	-17.65	NORTH 2=	12664.0127
AZIMUTH=	148.1388	EAST 2=	91339.2018
DISTANCE=	17.65	NORTH 2=	12634.0313
AZIMUTH=	180	EAST 2=	91329.885
DISTANCE=	5	NORTH 2=	12644.022
AZIMUTH=	270	EAST 2=	91324.885
DISTANCE=	5	NORTH 2=	12649.022
AZIMUTH=	0	EAST 2=	91329.885
DISTANCE=	5	NORTH 2=	12654.022
AZIMUTH=	236.5	EAST 2=	90877.6604
DISTANCE=	542.31	NORTH 2=	12349.7011
AZIMUTH=	236.5	EAST 2=	90877.6604
DISTANCE=	542.31	NORTH 2=	12349.7011
AZIMUTH=	236.5	EAST 2=	90877.6604
DISTANCE=	542.31	NORTH 2=	12349.7011

4 - COORDINATES >>
>> AZIMUTH &DISTANCE

EAST1=	9219.829		
NORTH1=	11355.38		
EAST2=	9130.025	AZIMUTH=	-116.5885251
NORTH2=	11310.43	DISTANC=	100.4245046
EAST2=	388142.9	AZIMUTH=	7.446004327
NORTH2=	2910673	DISTANC=	2923974.102
EAST2=	400	AZIMUTH=	-140.3842533
NORTH2=	700	DISTANC=	13832.08097
EAST2=	400	AZIMUTH=	-140.9066677
NORTH2=	500	DISTANC=	13986.72996
EAST2=	100	AZIMUTH=	-139.4560527
NORTH2=	694	DISTANC=	14029.8347
EAST2=	321	AZIMUTH=	-139.3616207
NORTH2=	987	DISTANC=	13663.54346
EAST2=	123	AZIMUTH=	-140.667698
NORTH2=	254	DISTANC=	14352.45245
EAST2=	888	AZIMUTH=	-141.1829097
NORTH2=	999	DISTANC=	13291.87495

5 - SLOPE STAKE

LINE 1		LINE 2	
DIST. 1=	5	DIST.=	7
ELEV. 1=	100	ELEV.=	98
DIST. 2=	12		
ELEV. 2=	101.4	SLOPE=	1
SLOPE=	0.2		
POINT OF INTERSECTION			
DISTANCE=	10		
ELEVATION=	101		

6 - INTERSECTION OF TWO LINES

LINE 1		LINE 2	
NORTH 1=	500	NORTH =	7125
EAST 1=	500	EAST =	3524
NORTH 2=	635	AZIMUTH=	50
EAST 2=	635	SLOPE=	1.191754
SLOPE=	1		
POINT OF INTERSECTION			
NORTH =	25904.31		
EAST =	25904.31		

7 - VERTICAL CURVE

GRADE 1=	0.5	M=E=	-0.22375
GRADE 2=	0.321	X=	2793.29609
LENGTH V.C.=	1000	Y=	6.98324022
P.V.I.STATION=	1500	B.V.C.STA=	1000
P.V.I.ELEVATION=	1000.235	B.V.C.ELV=	997.735
	EXTREME POINT		
STATION=	3793.296	ELEVATION=	1004.71824
VERTICAL PROFILE			

STATION	ELEVATION
1000	997.735
1020	997.834642
1040	997.933568
12740	933.079298
12800	932.1152
12900	930.49405
13000	928.855
12740	933.079298
12800	932.1152
12900	930.49405
13000	928.855
12740	933.079298
12800	932.1152
12900	930.49405
13000	928.855
12740	933.079298
12800	932.1152
12900	930.49405
13000	928.855
12740	933.079298

8 - COORDINATE OF CIRCULAR CURVE

RADIUS=	500
DELTA=	42.5
DIRECTION=	-1
P.C.STATION=	1500
P.C. EAST=	8236
P.C. NORTH=	3658
AZM(P.C.>P.I.)=	124
LENGTH OF CURVE=	370.882466

STATION	EAST	NORTH	CORD
1500	8236	3658	0
1510	8244.34574	3652.49134	9.999833
1520	8252.799978	3647.15069	19.99867
1550	8278.779644	3632.1578	49.97917
1600	8323.925484	3610.71554	99.83342
1650	8370.986437	3593.88746	149.4381
1700	8419.492285	3581.84171	198.6693
1720	8439.191007	3578.39106	218.2296
1740	8459.011962	3575.73091	237.7026
1760	8478.92344	3573.86551	257.0806
1780	8498.893587	3572.79785	276.3556
1800	8518.890455	3572.52964	295.5202
1820	8538.882053	3573.0613	314.5666
1840	8558.8364	3574.39199	333.4871
2000	8713.335375	3613.28103	479.4255

9 - SPIRAL DATA

RADIUS=	750
L. SPIRAL=	100
DELTA=	42.3654
<SPIRAL (RAD)=	0.066667
<SPIRAL (DEG)=	3.819719
<CIRCULAR C.=	34.72596
Xt=	99.95556
Yt=	2.221517
L.C.C.=	454.5618
K=	750.5555
T.T.=	340.8532
E=	54.9431

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المراجع

-1 Mot - general specifications for road part 2

-2 Mot – highway design manual part 1 & part 2

-3 Mot – highway design manual (vol. 4)

-4 Mot – road marking

-5 Mot – manuals for uniform traffic control devices

-6 Mot – standard drawing for culvert more than 1 m high of fill

-7 Mot – Non standard drawing for culvert less than 1m high of fill

-8 Mot – standard drawing for retaining walls type 3& ,2 , 1

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