

Smithers Bridge Load Test

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Smithers Bridge Load Test

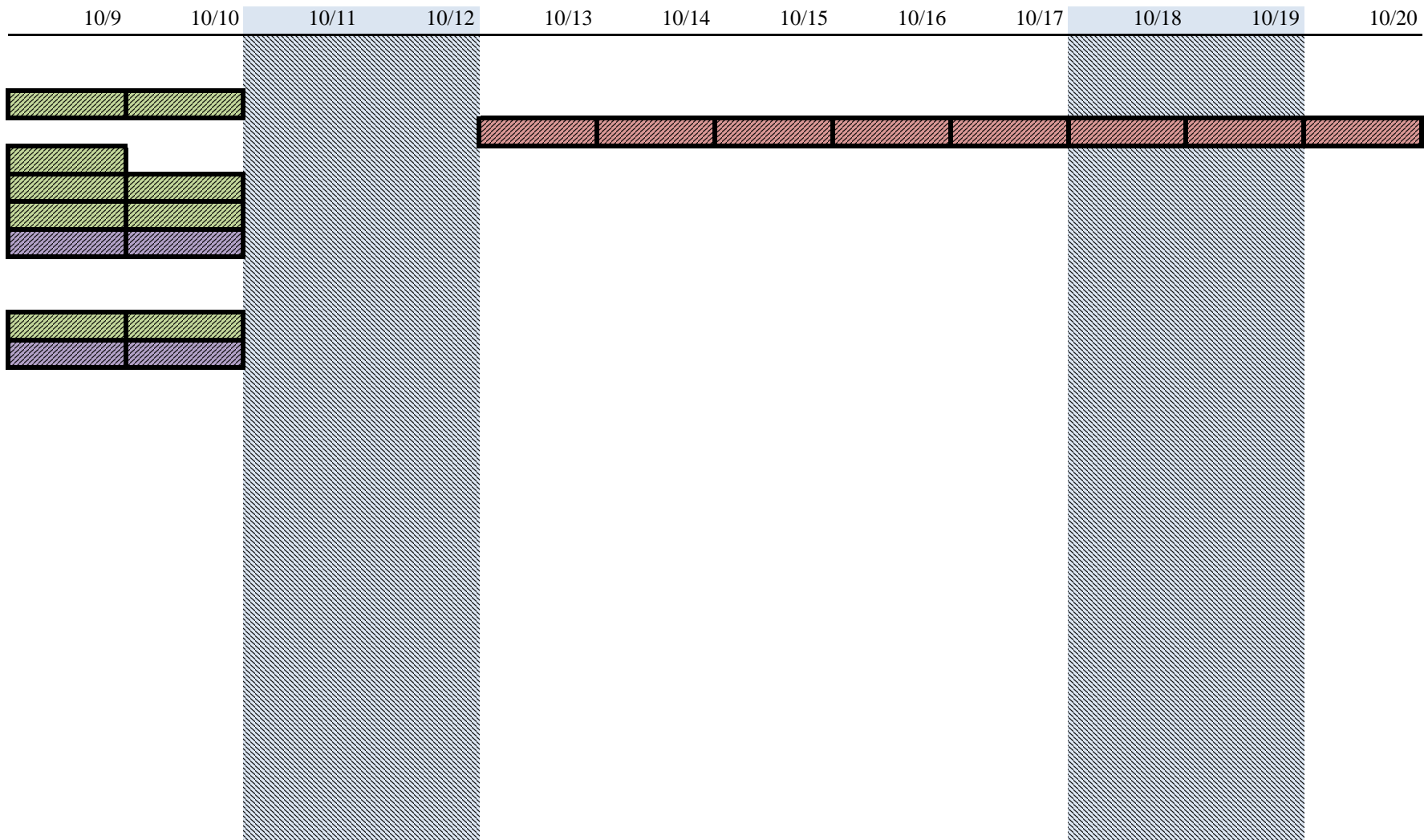
Major Tasks

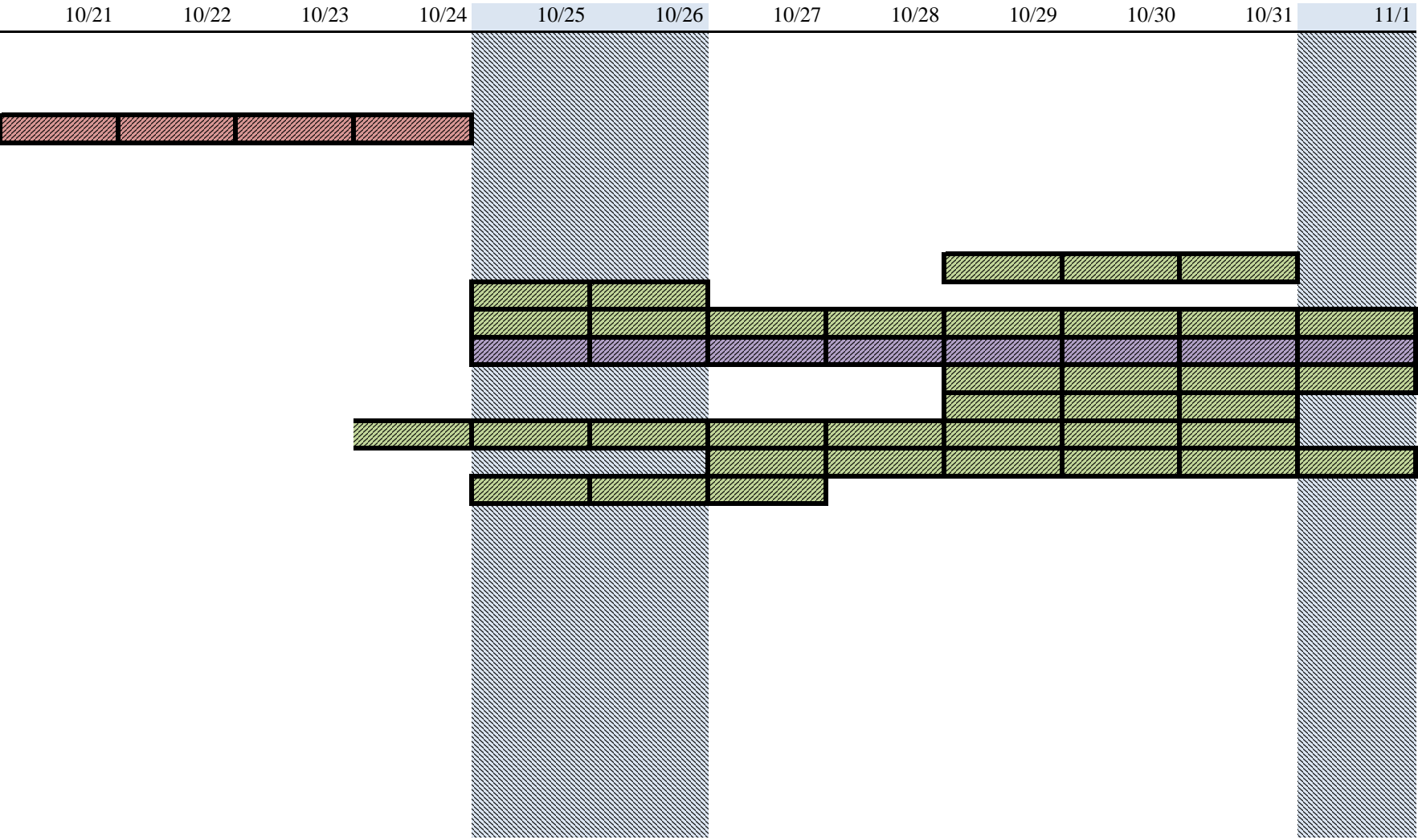
- 1 Complete Preliminary Site Investigation
- 2 Meeting - WV Material Dept
- 3 Develop Complete Drawings and 3D CAD Model
- 4 Material Testing and Analysis
- 5 Develop Prep. Requirements for WVDOT
- 6 Global Instrumentation Layout (Spans and Piers)
- 7 Local Instrumentation Design (Connections)
- 8 Instrumentation Design - Michigan Ave
- 9 Instrumentation Bracket Design
- 10 Cable Length Determination
- 11 A Priori Modeling - Smithers Bridge
- 12 A Priori Modeling - Michigan Ave
- 13 Bound Expected Behavior w/ Model
- 14 Test Load Ratings
- 15 Equipment Purchase and Delivery
- 16 Equipment Preparation
- 17 Cable Preparation
- 18 Deployment
- 19 Instrumentation Installation - Smithers
- 20 Instrumentation Installation - Michigan Ave
- 21 Cabling - Smithers Bridge
- 22 Cabling - Michigan Ave
- 23 Troubleshooting
- 24 Test
- 25 Test - Michigan Ave
- 26 Breakdown
- 27 Preliminary Data Reduction
- 28 Load Ratings
- 29 Repair and Retrofit Recommendations

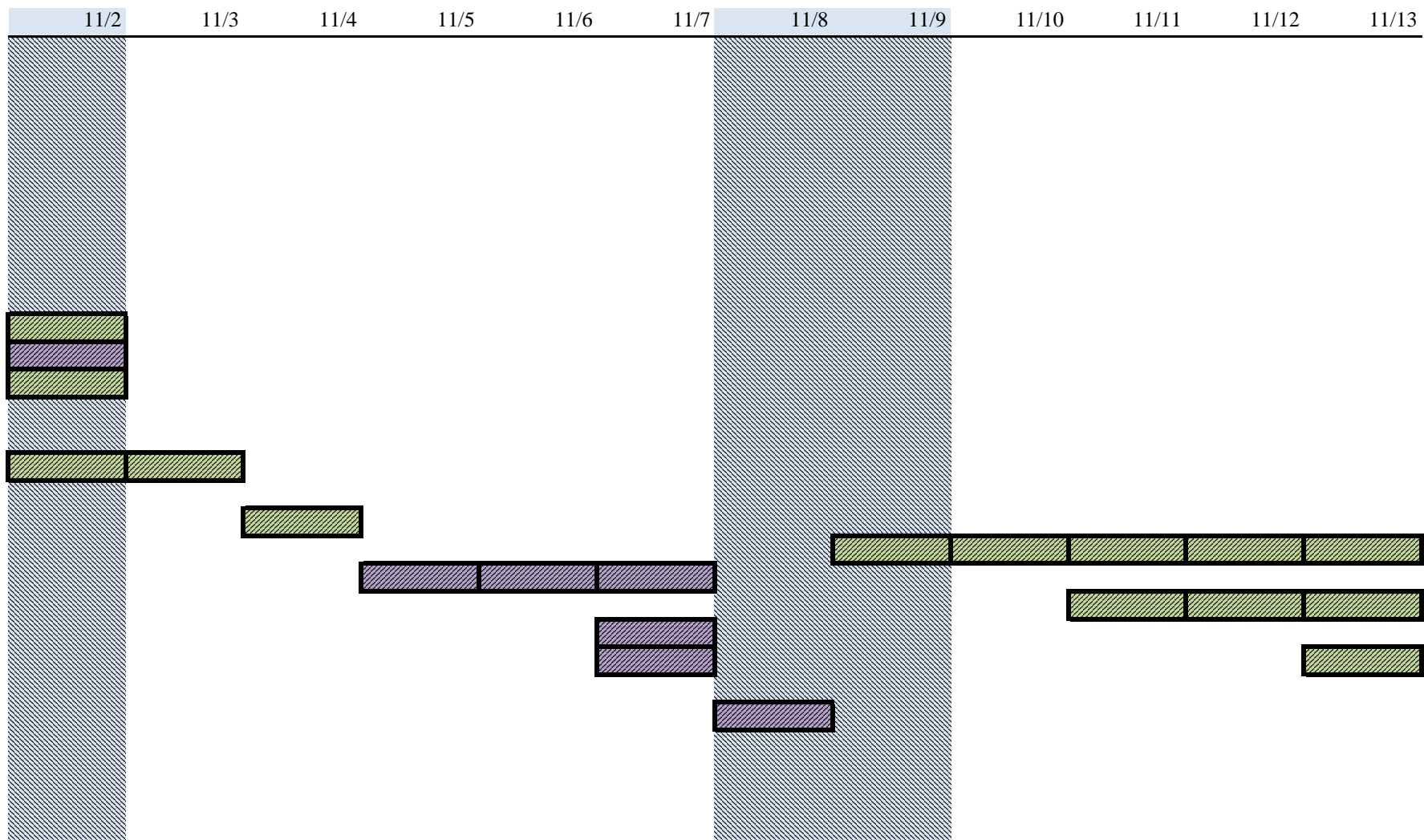
Resources

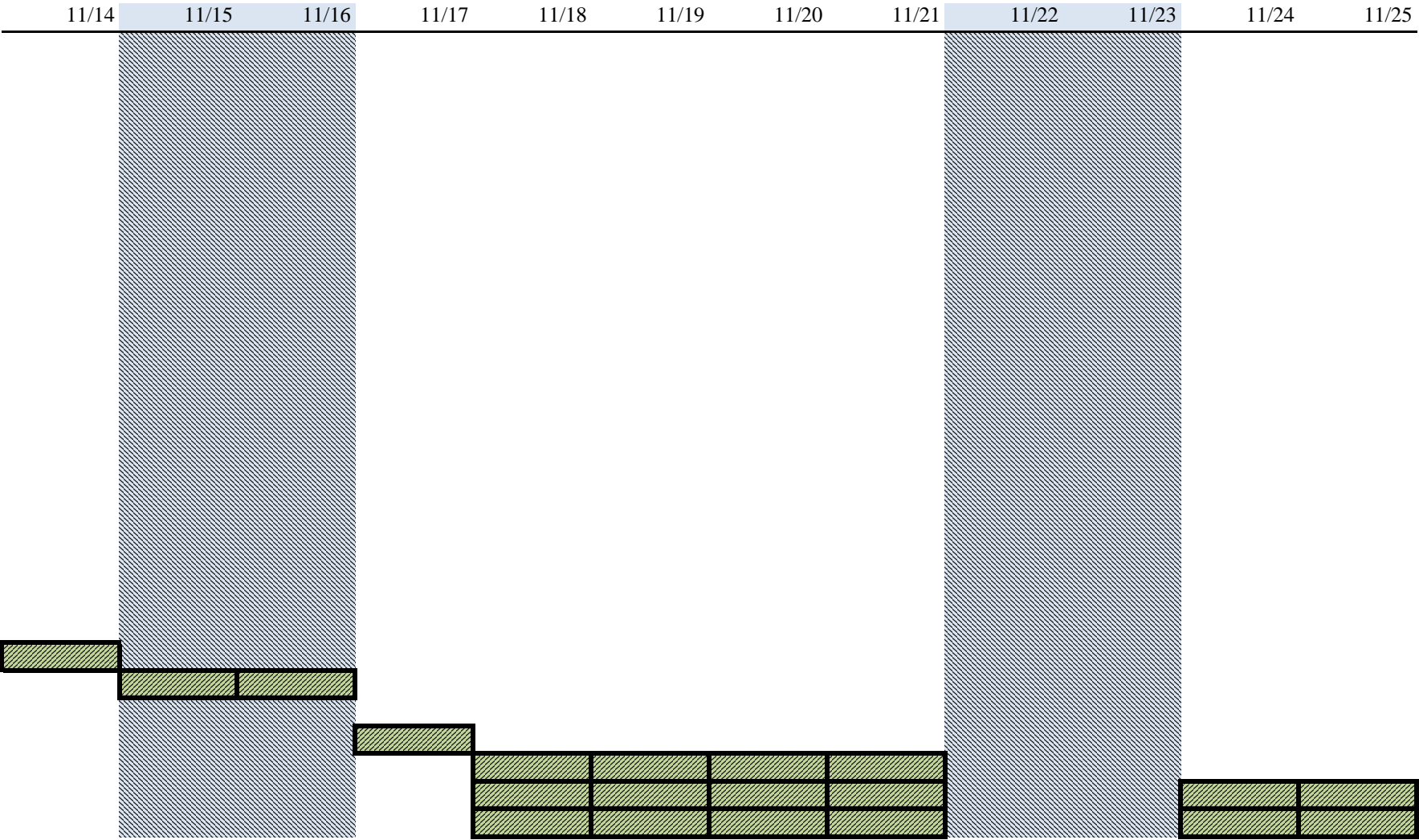
Jeff Weidner
John Prader
Nathan Dubbs
Yun Zhou
Larry Egan
WVDOT

<i>Task Description</i>	<i>Task #</i>	10/2	10/3	10/4	10/5	10/6	10/7	10/8
Complete Preliminary Site Investigation	1							
Meeting - WV Material Dept	2							
Develop Complete Drawings and 3D CAD Model	3							
Material Testing and Analysis	4							
Develop Prep. Requirements for WVDOT	5							
Global Instrumentation Layout (Spans and Piers)	6							
Local Instrumentation Design (Connections)	7							
Instrumentation Design - Michigan Ave	8							
Instrumentation Bracket Design	9							
Cable Length Determination	10							
A Priori Modeling - Smithers Bridge	11							
A Priori Modeling - Michigan Ave	12							
Bound Expected Behavior w/ Model	13							
Test Load Ratings	14							
Equipment Purchase and Delivery	15							
Equipment Preparation	16							
Cable Preparation	17							
Deployment	18							
Instrumentation Installation - Smithers	19							
Instrumentation Installation - Michigan Ave	20							
Cabling - Smithers Bridge	21							
Cabling - Michigan Ave	22							
Troubleshooting	23							
Test	24							
Test - Michigan Ave	25							
Breakdown	26							
Preliminary Data Reduction	27							
Load Ratings	28							
Repair and Retrofit Recommendations	29							

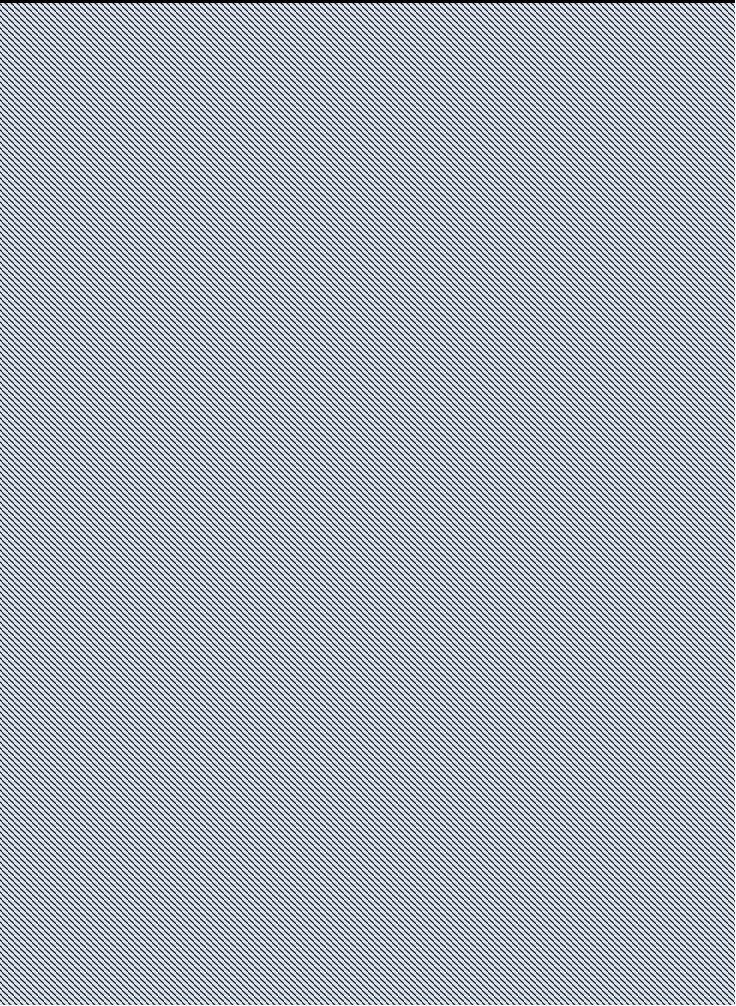








11/26	11/27	11/28	11/29	11/30
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Material Sampling

- ### Instrumentation Prep

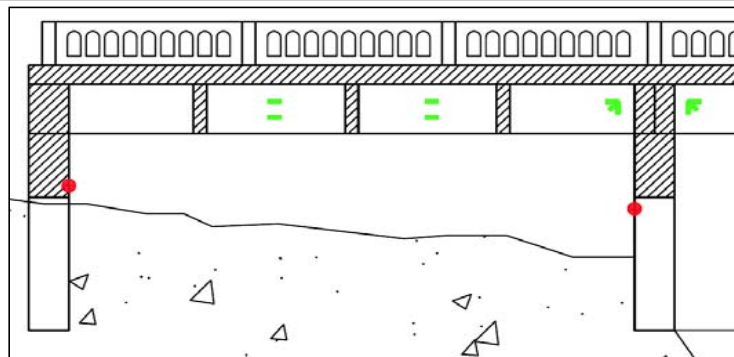
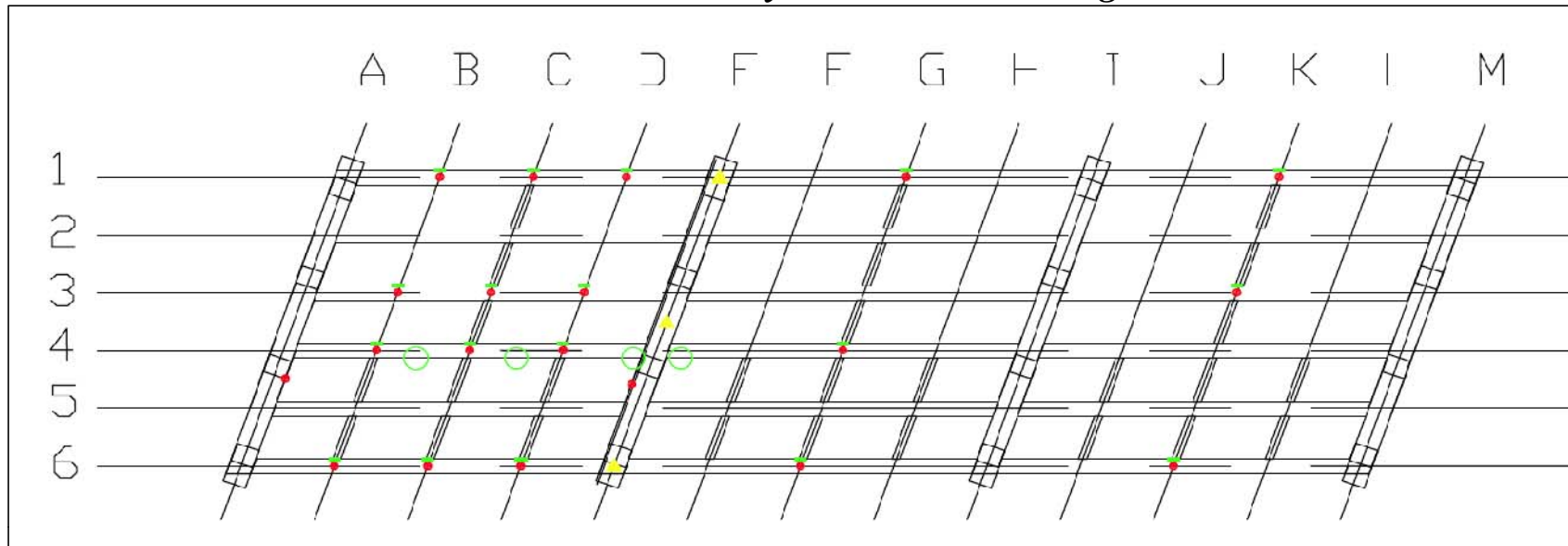
- ## Testing

-

Gage Locations requiring concrete chipping and sign post installation (McDonalds is closest to Grid Point A1)



Static Sensor Layout - Smithers Bridge



Concrete Strain

B4_1
B4_2
C4_1
C4_2

4 Total

Strain Rosettes

E4_1
E4_2

2 Total

Diaphragm Rotation

E1_R
E3.5_R
E6_R

3 Total

Lateral Displacement of Pier

A4_L
E4_L

2 Total

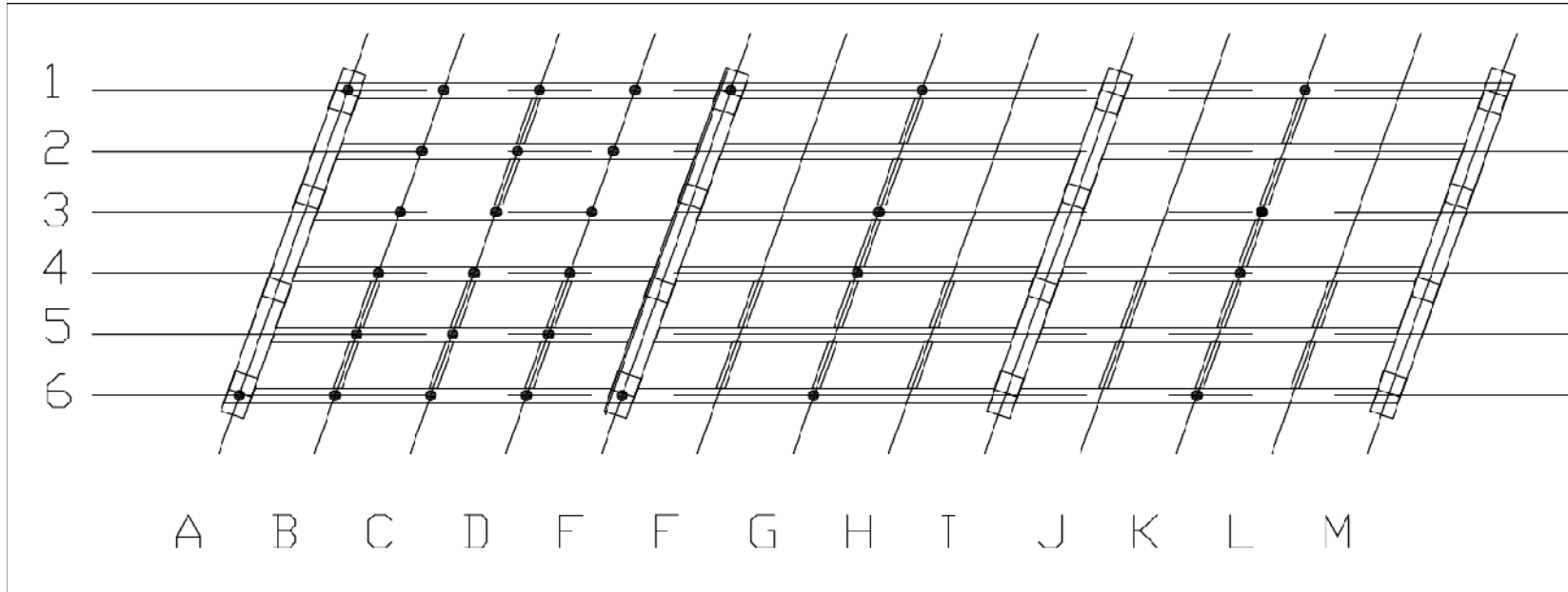
Disp. Steel Strain

B1_D	B1_SS
B3_D	B3_SS
B4_D	B4_SS
B6_D	B6_SS
C1_D	C1_SS
C3_D	C3_SS
C4_D	C4_SS
C6_D	C6_SS
D1_D	D1_SS
D3_D	D3_SS
D4_D	D4_SS
D6_D	D6_SS
G1_D	G1_SS
G4_D	G4_SS
G6_D	G6_SS
K1_D	K1_SS
K3_D	K3_SS
K6_D	K6_SS
<hr/> 18 Total	<hr/> 18 Total

Red Dot
Green Rectangle
Yellow Triangle
Green Circle

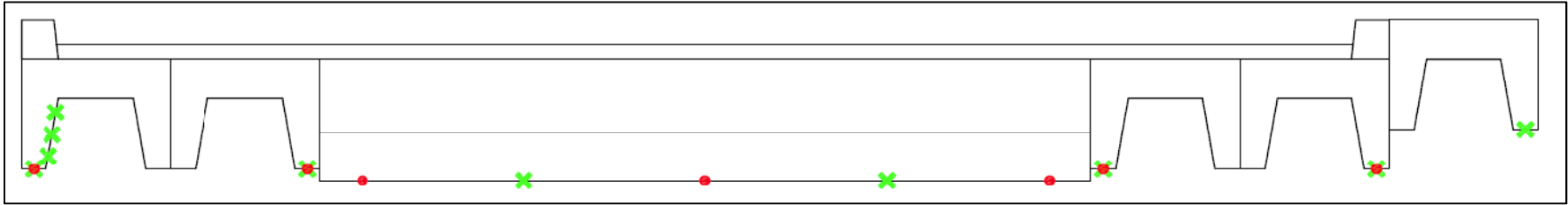
Vertical or Lateral Displacement
Longitudinal Strain
Pier Rotation
Concrete Strain

18	Vertical Displacement
18	Longitudinal Strain
4	Strain Profile
2	Strain Rosettes
2	Lateral Pier Displacement
3	Rotations
<hr/> 47	<hr/> TOTAL

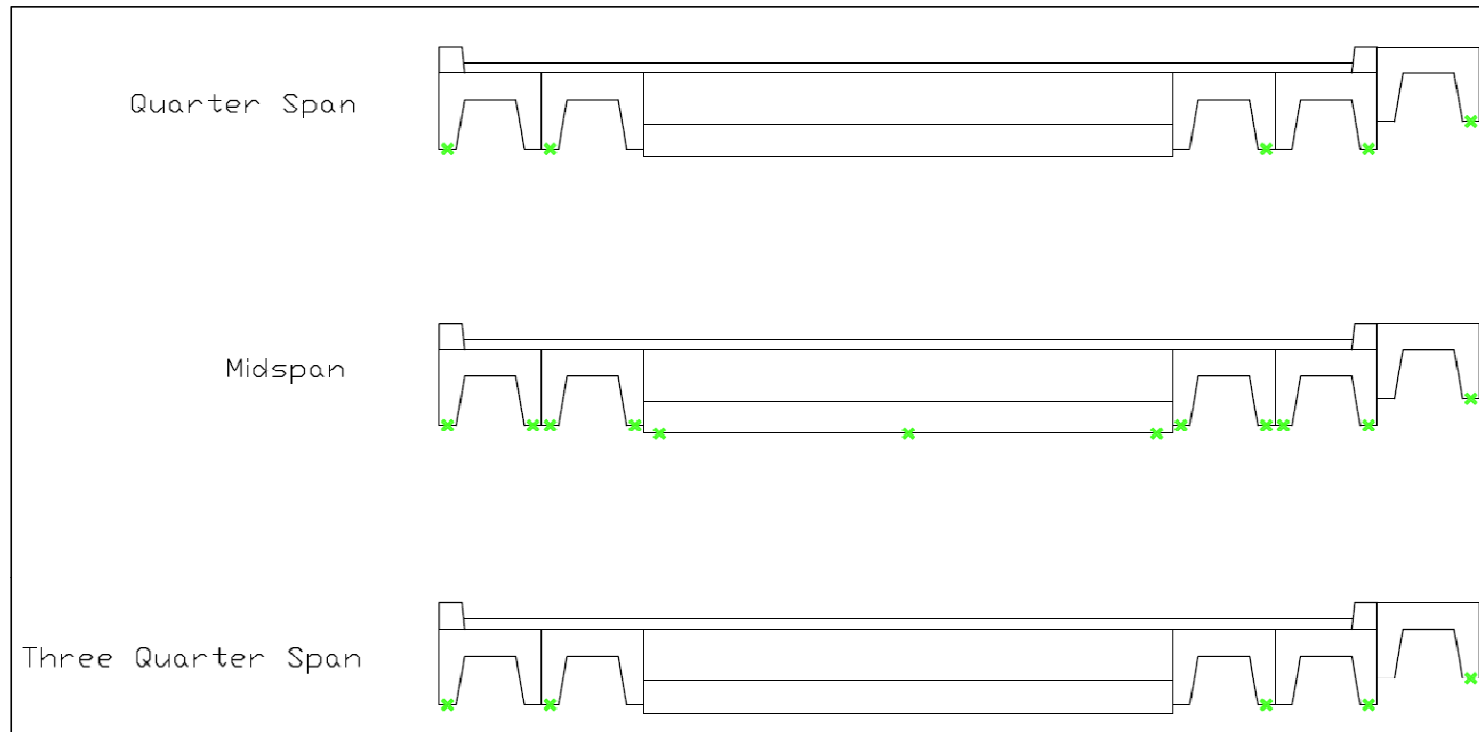


30 Total Channels - Using Seismic Accelerometers and Coaxial Cable

Dynamic Sensor Layout - Michigan Ave Bridge



All gages for Michigan Ave are located at the center line, with the exception of a lateral gage at each end of the arch to measure any lateral movement. The three strain gages on the prestressed beam will be strain transducers mounted with acrylic blocks, as opposed to surface mounted gages.



22 Total Channels - Using Seismic Accelerometers and Coaxial Cable

Cabling - Current Inventory

in progress

Cabling - Requirements

Required Cable

Cable #	Size	Length	Gage Location
34	4	162	K6
35	3	162	K6
36	4	138	K3
37	3	138	K3
1	4	126	B6
2	3	126	B6
38	4	122	K1
39	3	122	K1
44	4	122	A4.5
9	4	114	C6
10	3	114	C6
28	4	114	G6
29	3	114	G6
3	4	110	B4
4	3	110	B4
40	3	104	B'4
41	3	104	B'4
5	4	102	B3
6	3	102	B3
17	4	102	D6
18	3	102	D6
11	4	98	C4
12	3	98	C4
30	4	98	G4

Required Cable

Cable #	Size	Length	Gage Location
31	3	98	G4
42	3	92	C'4
43	3	92	C'4
13	4	90	C3
14	3	90	C3
25	4	90	E6
7	4	86	B1
8	3	86	B1
19	4	86	D4
20	3	86	D4
21	4	78	D3
22	3	78	D3
15	4	74	C1
16	3	74	C1
32	4	74	G1
33	3	74	G1
45	4	74	E4.5
46	4	74	E4_1
47	4	74	E4_2
26	4	70	E3.5
23	4	62	D1
24	3	62	D1
27	4	50	E1

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Cost Estimate - Drexel University

Item #	Description	Quantity	Unit Price	Cost
1	4-Pair Cable (1000 ft)	3	\$ 363.00	\$ 1,089.00
2	3-Pair Cable (100 ft)	0	\$ 33.00	\$ -
3	Concrete Strain Gages	0	\$ 40.00	\$ -
4	Strain Rosettes	2	\$ 200.00	\$ 400.00
5	Steel Strain Gages	10	\$ 50.00	\$ 500.00
6	Wire Ties (pack of 100)	10	\$ 4.30	\$ 43.00
7	Steel Washer	40	\$ 1.25	\$ 50.00
8	Eyelets - Cable Runs (Pack of 10)	10	\$ 3.12	\$ 31.20
9	Steel Angle for rotation brackets (3 ft)	6	\$ 32.00	\$ 192.00
10	Heat Shrink	1	\$ 33.00	\$ 33.00
11	Concrete Epoxy	15	\$ 15.00	\$ 225.00
12	Surface Prep Concrete Epoxy	0	\$ -	\$ -
13	4-Pin Military Connectors	0	\$ -	\$ -
14	Screwdrivers	0	\$ -	\$ -
15	Hotel (Per Night)	14	\$ 120.00	\$ 1,680.00
16	Food (Per Day - Entire Group)	14	\$ 125.00	\$ 1,750.00
17	Gas (Per Week)	2	\$ 300.00	\$ 600.00
Total				\$ 6,593.20