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Roadway Inventory Video & LiDAR (RIVaL)

Task Order 2: Data Extraction

This Task Order details the services to be performed and products to be delivered by **Cyclomedia Technology, Inc.** (Cyclomedia) to the **Texas Department of Transportation (TxDOT)**, along with pricing and payment terms, and the designated project areas with respect to the defined deliverables of the RiVAL project. All services and responsibilities of this Task Order, adhere to the existing Contract (*60100000000000000000000015265*) & Scope of Work dated 12/01/2024 (herein "Contract").

As part of the RIVaL project, and in support of TxDOT's *Transportation Programming & Planning Division* (TPP), Cyclomedia will extract and deliver all features as outlined in section 1 of this task order.

All roads to be included in the extraction scope have been provided to Cyclomedia by TxDOT via an Esri geodatabase file. A GIS file of final collection routes are included with this SOW.

1. Deliverables:

☐ **Data Extraction:** A GDB containing event tables following the general methodology below as it pertains to each specific table outlined.

General deliverable guidelines:

- Only complete LRS routes are to be delivered. No partial routes will be delivered outside of phase 0 unless unique circumstances require it such as partial capture on a route. These routes will be noted within the deliverable summary.

- The LRS conflation is done using EPSG code 4269 to minimize the potential for data shifts that can occur when projecting data to and from different coordinate systems.

- A tolerance of up to 250 feet is allowed to interpolate small gaps in areas where missing data may exist.

- For undivided roadways that only have a single LRS route, both directions of travel are included within the delivered data. For example, if each direction of travel has a single through lane, a count of two, one for each direction, will be reported back on the LRS route.

- No extracted data is to be delivered on ramps or connectors.

Below is an overview of each feature delivered within the GDB.

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Bike Pedestrian Facility

Delivered Routes: On-System
Deliverable Format: Event Table

A bike pedestrian facility is a dedicated section of a paved surface, either on or off the roadway, to allow bike traffic to traverse safely. To be included within the deliverable, a bike pedestrian facility needs to be denoted by pavement striping and symbols. At intersections, if the bike pedestrian facility's pavement striping and symbols end at the beginning of the intersection and are resumed after the intersection, the extraction will follow the break along with it. If the striping and symbols continue through the intersection, the extraction will follow through the intersection as well. The facility types will follow the domain list in the table below, however, sidewalk will not be identified nor delivered within the GDB.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Bike Pedestrian Facility	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	BIKE_PED_FCLTY_TYPE_ID	SHORT		1=Standard Bike Lane, 2=Buffered Bike Lane, 3=Separated Bike Lane, 4=Bikeable Shoulder, 5=Shared Use Path, 6=Sidewalk

Bridge

Delivered Routes: On-System, Tolls (TL), Grade Separated Connectors
Deliverable Format: Event Table

Bridges are identified as a structure on the DOT maintained route used to carry a vehicle over an obstacle such as another road, railroad or body of water. To be included in the deliverable, the bridge must have had the overpass driven by the capture vehicle and be on the LRS routes provided by the DOT. The bridge extraction will start at the seam where the bridge meets the roadway and carry along the full extent of the bridge deck to the end seam. To be included within the deliverable, the collection vehicle must have driven across the full extent of the bridge. If the collection vehicle did not capture the bridge deck, it will not be included in the deliverable. The bridge extraction will also include the TxDOT provided NBI number when a match is able to be made between the two datasets. If no match is possible, the NBI field will be left blank.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Bridge	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	BRDG_STRUC_NGR	STRING		

Inside Shoulder

Delivered Routes: On-System, Tolls (TL)
Deliverable Format: Event Table

Inside shoulders are sections along the roadway, beyond the designated lanes, used to allow room for safety measures along with a space for a vehicle to pull over if necessary. For divided roadways, the inside shoulder is identified as left of the collection vehicle. For undivided roadways, the inside shoulder is identified as left of the ascending direction of the DFOs. The inside shoulder is to have complete coverage for each LRS route. Any gaps identified that are 250 feet or less, the data will be interpolated based on the shoulder type and width leading into the gap and an indicator in a comment field that there was interpolation. Any gap larger than 250 feet will be assigned as a "None" type and a width of 0. Shoulders must have a width of 1 foot or greater to be classified as any type other than "None".

The type "Combo" will remain in the domain list, but will not be a delivered type in the extracted data. The field SHLDER_USE_TYPE_ID will remain in the GDB, but is not an extracted attribute included within the scope. The shoulder width is an average measurement rounded to the

nearest foot. A new shoulder segment is started when either the average width changes by more than a foot and/or the type changes.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Inside Shoulder	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	SHLDR_TYPE_ID	SHORT		1=None,2=Bituminous, 3=Concrete, 4=Flex/Stab (Unpaved), 5=Combo
	SHLDR_USE_TYPE_ID	SHORT		1=No Designated Use, 2=Diagonal Parking, 3=Parallel Parking, 4=Bicycle, 5=Bus, 6=Emergency Only, 7=Peak Only, 8=Other, 9=Evacuation Lane
	INSD_SHLDR_WIDTH_MS	DOUBLE		

Outside Shoulder

Delivered Routes: On-System, Tolls (TL)
Deliverable Format: Event Table

Outside shoulders are sections along the roadway, beyond the designated lanes, used to allow room for safety measures along with a space for a vehicle to pull over if necessary. For divided roadways, the outside shoulder is identified as right of the collection vehicle. For undivided roadways, the outside shoulder is identified as right of the ascending direction of the DFOs. The inside shoulder is to have complete coverage for each LRS route. Any gaps identified that are 250 feet or less, the data will be interpolated based on the shoulder type and width leading into the gap and an indicator in a comment field that there was interpolation. Any gap larger than 250 feet will be assigned as a "None" type and a width of 0. Shoulders must have a width of 1 foot or greater to be classified as any type other than "None".

The type "Combo" will remain in the domain list, but will not be a delivered type in the extracted data. The field SHLDER_USE_TYPE_ID will remain in the GDB, but is not an extracted attribute

included within the scope. The shoulder width is an average measurement rounded to the nearest foot. A new shoulder segment is started when either the average width changes by more than a foot and/or the type changes.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Outside Shoulder	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	SHLDR_TYPE_ID	SHORT		1=None,2=Bituminous, 3=Concrete, 4=Flex/Stab (Unpaved), 5=Combo
	SHLDR_USE_TYPE_ID	SHORT		1=No Designated Use, 2=Diagonal Parking, 3=Parallel Parking, 4=Bicycle, 5=Bus, 6=Emergency Only, 7=Peak Only, 8=Other, 9=Evacuation Lane
	OUTSD_SHLDR_WIDTH_MS	DOUBLE		

Lane Width

Delivered Routes: On-System, Tolls (TL)
Deliverable Format: Event Table

Lane width is the width of the through lane's identified on any section of roadway rounded to the nearest foot. The measurement is taken from the relative center of each stripe denoting the edges of travel for the lane. When multiple lanes present, the most repeated value is returned. When two lanes are measured and each have a different width, the larger lane width is returned.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Lane Width	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	LANE_WIDTH_MS	LONG		

Left Turn Lane

Delivered Routes: On-System, Tolls (TL)
Deliverable Format: Event Table

Left turn lanes are dedicated lanes to allow vehicle traffic to make a left turn from the road being driven. To be included in the extraction, the turning lane needs to be a dedicated left turn. Combination through and left turn lanes are not included within this event layer. The deliverable includes both a count of the total number of exclusive left turn lanes and the width rounded to the nearest foot. When multiple lanes are present, the most repeated value is returned. When two left turn lanes are present with different measured widths, the larger left turn lane width is returned.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Left Turn Lane	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	LT_TURN_LANE_TYPE_ID	SHORT		1=Exclusive Left Turn Lane; no through traffic,2=Two-Way Left Turn Lane; Continuous Center; no through traffic
	LT_TURN_LANE_CNT	LONG		
	LT_TURN_LANE_WIDTH_MS	LONG		

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Right Turn Lane

Delivered Routes: On-System, Tolls (TL)
Deliverable Format: Event Table

Right turn lanes are dedicated lanes to allow vehicle traffic to make a right turn from the road being driven. To be included in the extraction, the turning lane needs to be a dedicated right turn. Combination through and right turn lanes are not included within this event layer. The deliverable includes both a count of the total number of exclusive right turn lanes and the width rounded to the nearest foot. When multiple lanes are present, the most repeated value is returned. When two right turn lanes are present with different measured widths, the larger right turn lane width is returned.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Right Turn Lane	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	RT_TURN_LANE_TYPE_ID	LONG		1=Exclusive Right Turn Lane; no through traffic,2=Continuous Right Turn Lane; no through traffic
	RT_TURN_LANE_CNT	LONG		
	RT_TURN_LANE_WIDTH_MS	LONG		

Maximum Speed Limit

Delivered Routes: On-System, Tolls (TL)
Deliverable Format: Event Table

The maximum speed limit uses the regulatory speed limit signs identified on the roadway to assign speed zones using the DFO value and LRS route IDs for the identified speed limit signs. The highest regulatory speed limit sign found is applied to the beginning of the zone and the zone will end when the speed limit changes or the LRS route ends. With each deliverable a list of LRS routes where no regulatory speed limit sign was found will be provided back to TxDOT. Advisory, temporary or other non-regulatory speed limit signs are not to be included within the deliverable. For undivided routes, only the speed limit signs on the ascending direction of travel are to be considered for the Maximum speed limit.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Maximum Speed Limit	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	MAX_SPD_LMT_MS	LONG		

Median

Delivered Routes: On-System, Tolls (TL)
Deliverable Format: Event Table

Medians are a physical object or barrier used to separate differing directions of vehicle travel. Medians will be assigned to the ascending direction of the LRS and is to have complete coverage of the LRS route. Gaps of 250 feet or less can be interpolated and denoted as such within a notes field. Gaps greater than 250 feet will have their median type set to "None" and a width of 0. To be considered as a "Curb" type, the curb should be 4" or greater. Undivided roadways will have a median type of "None" and a width of 0. When multiple positive barrier types are present within the median, a hierarchy will be applied as follows: rigid, semi-rigid, flexible and lastly vegetation/terrain. Two way center left turn lanes are not to be considered as a median. Width measurements are measured from the edge of the paved surface for each direction of travel and rounded to the nearest foot. When the median type and/or the width changes, a new segment is to be started.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Median Type	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	MDN_TYPE_ID	LONG		1=None, 2=Unprotected, 3=Curbed, 4=Positive barrier - vegetation/terrain, 5=Positive barrier - flexible, 6=Positive barrier - semi-rigid, 7=Positive barrier - rigid
	MDN_WIDTH_MS	LONG		

Number of Through Lanes

Delivered Routes: On-System, Tolls (TL), Off-System, Grade Separated Connectors
Deliverable Format: Event Table

Through lanes are used to carry vehicle traffic on the current road they are traveling on. The deliverable will report the total count of through lanes for each LRS route with a new segment starting when the count of through lanes change. Each LRS route delivered is to have complete coverage. Gaps of 250 feet or less can be interpolated and denoted as such within a notes field. Gaps greater than 250 feet will have their through lane count set to 0 and denoted as such within a notes field. Acceleration, deceleration and auxiliary lanes are to be identified as through lanes if they are greater than .4 miles. Combination turn and through lanes at an intersection are to be considered through lanes. At T-intersections, the middle turn lane should be marked as a through lane. If two or less turn lanes exist at the T-intersection, the right turn lane is identified as a through lane.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Number of Through Lanes	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	NBR_THRU_LANE_CNT	LONG		

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Roadbed Width

Delivered Routes: On-System, Tolls (TL)
Deliverable Format: Event Table

The roadbed width is the sum of each delivered lane and shoulder width. On undivided routes, the roadbed width will measure across both directions of travel. For divided routes, each route will be measured independently. A new segment will be started when change happens to the roadway such as, a new lane, a change in shoulder width or a change in the lane widths.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Roadbed Width	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_LN_BEGIN_DFO_MS	DOUBLE	6,3	
	ASSET_LN_END_DFO_MS	DOUBLE	6,3	
	RDBD_WIDTH_MS	DOUBLE		

Illumination

Delivered Routes: On-System
Deliverable Format: Event Table

Illumination is a lighting system used to illuminate the TxDOT maintained network. The event table includes the type of light and the height of the bulb from the base measured to the nearest foot. Where underpass lighting is identified, a single point will be placed the type underpass identified to cover the entire extent of the underpass. Individual points for each light in the underpass will not be delivered. The type Miscellaneous will be used for any public lighting identified that does not fit into any of the other types. Examples of this include, but are not limited to, lights attached to telephone poles, traffic signal poles or pedestrian lighting. Private lights are not to be included within the deliverable. If a light is unable to be identified as private, it will be collected and delivered as the miscellaneous type. For Illumination that have multiple bulbs present, the height value for the highest bulb will be returned.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	Values
Illumination	OBJECTID	ObjectID		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_PNT_DFO_MS	DOUBLE	6,3	
	ILLUM_TYPE	LONG		1=High Mast, 2=Conventional, 3=Underpass, 4=Miscellaneous
	ILLUM_HGHT_MS	LONG		

Signs

Delivered Routes: On-System, Grade Separated Connectors
Deliverable Format: Feature Class

Signs are dedicated features placed along the roadway intended to instruct, regulate or inform drivers and/or pedestrians. The deliverable will be a feature class including both flat sheet and extruded panel signs with the XYZ location of the sign in the relative center of the sign face. Each sign will have their LRS designated based on the route the sign is intended for, and the location attribute is applied based on the sign's relative location to the roadway. The MUTCD codes will follow the 11th edition and will also include 10 additional M1 series state codes. Signs that do not have a code according to the 11th edition book or the M1 series state codes will be assigned as NA. The sign dimensions will be rounded to the nearest 6 inches and all traffic signs delivered will include the unique ID of the sign support they're attached to. Sign Text will include the text for all variable message signs in all uppercase format. When there's visible separation of text arrangement a semicolon ";" is used to denote the separation. If all text on the sign can be comprehensively read from top-down and left-right no semicolon is needed.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Signs	OBJECTID	ObjectID		
	UNIQUEID	TEXT		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_PNT_DFO_MS	DOUBLE	6,3	
	SIGN_LOCATION	TEXT		1=Right, 2=Left, 3=Overhead
	MUTCD	TEXT		11th Edition MUTCD codes + 10 M1 series TxDOT State Codes
	SIGN_HEIGHT	SHORT	3,0	
	SIGN_WIDTH	SHORT	3,0	
	STRUCTURE_ID	TEXT		
	SS_URL	TEXT		
	SIGN_TEXT	TEXT		

Sign Supports

Delivered Routes: On-System, Grade Separated Connectors
Deliverable Format: Feature Class

Sign supports are vertical post(s) used to support one or more signs on the roadway. The XYZ location of the sign support will be delivered at the base of the sign support when a single post is present and at the base of the post closest to the roadway when multiple are present. For supports that span across the roadway to suspend overhead signs, the XYZ location will be delivered at the base of the support on the right side of the roadway relative to the vehicle. For sign supports suspending signs that belong to multiple LRS routes, the LRS route assigned to the support will based on the LRS route driven where the sign support was first encountered.

ASSET	COLUMN	DATA TYPE	PRECISION/SCALE	VALUES
Sign Supports	OBJECTID	ObjectID		
	UNIQUEID	TEXT		
	RDBD_GMTRY_LN_ID	LONG		
	RTE_DEFN_LN_NM	TEXT		
	ASSET_PNT_DFO_MS	DOUBLE	6,3	
	SUPPORT_LOCATION	TEXT		1=Right, 2=Left, 3=Overhead
	SUPPORT_TYPE	TEXT		1=Steel Round, 2=Square Tube, 3=W-Beam, 4=Bridge Mounted, 5=Cantilever, 6=Truss Bridge (Gantry), 7=Wooden Post, 8=Other
	SS_URL	TEXT		