

Asset Project Requirements – Bikeways (BIKE)

State Will Provide

- Existing statewide spatial bikeway data (ready March 2022) – ESRI feature class

General Requirements

The Minnesota Geospatial Council has established a Bikeways Data Standard. The standard schema provides a single, commonly accepted set of attribute specifications for data inventory sharing between local, regional, and state governments for purposes of data exchange between agencies.

- Minnesota’s Bikeway Standard and the domain tables are located at the MnGEO Bikeways Data Standard for Minnesota website.
<https://www.mngeo.state.mn.us/committee/standards/bikeways/index.html>.
- To comply with the data standard, the fields must use the codes from specified domains, but does not need to contain the domain tables with the data.

Extraction Guidance

Extract bikeway locations within State Rights of Way (ROW) according to Scope of Work Areas.

Extracted bikeway locations will be a line string with intermittent points. Segmentation will be based upon attribution and ability to meet 3-foot accuracy to the center of the bike lane.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Asset Specific Quality Control

- Knowing where the State Rights of Way (ROW) is located will allow for more accurate State owned bikeway extraction. The State ROW layer may contain gaps. Flag bikeway locations where the bikeway may or may not be contained within a State ROW because the ROW layer is not available, or construction has occurred, and the ROW layer might be outdated.

Deliverable

1. Bikeway dataset – shapefile or geodatabase with datum NAD 1983 Zone 15N

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the bikeways. According to the Minnesota Bikeways Data Standard, many domains exist for multiple fields in the data table. The exact table formats and attribution can be found at <https://www.mngeo.state.mn.us/committee/standards/bikeways/index.html>. Not all attribution can be applied through remote sensing. The final table formats and attribution will be discussed upon notice to proceed.

Database Name	Description	Domain
FACTYPE	Bike facility's main function; specifying on-road or off-road	Domain: BikewayFacilityType
STATE_SYS	Is the bikeway part of a state system?	Domain: YesNoUnknown
BKWYSURF	Prominent surface of bikeway type	Domain: BikewaySurface
YR_OPEN	Year bikeway first opened to users	
WIDTH_FT	Width of bikeway segment in feet	
PVMTMARKS	Whether pavement markings are present along the bikeway	Domain: YesNoUnknown
LIGHTING	Whether lighting exists along the bikeway segment.	Domain: YesNoUnknown
SIGNING	Whether active transportation relate signing (eg regulatory, wayfinding, warning signs) exist along the bikeway segment	Domain: YesNoUnknown
SEPARATION	Whether the bikeway is part of a separate system, and the type of separation	Domain: BikewaySeparation
ROAD_BR	Whether the bikeway has a roadside barrier, and what type of barrier	Domain: RoadsideBarrier
RMBL_STRIPS	Whether rumble strips (any kind) exist along bikeway segment	Domain: YesNoUnknown
RMBL_TYPE	Type of rumble strip that exists along bikeway	Domain: RumbleStripType
RMBL_PLACE	Placement of rumble strip that exists along bikeway	Domain: RumbleStripPlacement
DATASOURCE	Data source of bikeway	Domain: BikewayDataSource
EDIT_DATE	Date of last substantial edits to bikeway record	
COMMENTS	General field for comments	

Asset Project Requirements - Bridge Clearance (BCLEAR)

State Will Provide

- Existing Bridge clearance data - excel spreadsheet
- Bridge Office Vertical and Horizontal Bridge Clearance Report – PDF
<http://www.dot.state.mn.us/bridge/pdf/clearanceform.pdf>
- OFCVO ArcGIS Online Permit Tool - shapefile

General Requirements

Create one-pager for each bridge that contains the bridge image, bridge lidar profile, and measurements that match requirements within Bridge Office Vertical and Horizontal Bridge Clearance Report. The one pager template must be reviewed and approved by State.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Extraction Guidance

Each clearance value should have an associated GPS point.

Quality Control

Perform quality control analytics and report to the state any clearance data that is >1 std deviation from mean statistically valid. Report how many bridge clearance data attributes were changed within each deliverable 2 and 3 in deliverable section below.

Deliverable

1. One-pager for each bridge - electronic PDF format
2. Updated Bridge clearance data- excel spreadsheet
3. Update OFCVO permit tool – shapefile with datum WGS84
4. Report on quality control measures as specified above – word document

Asset Attribution

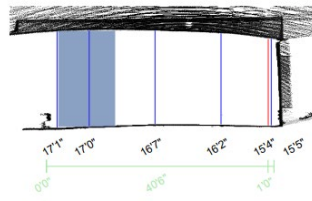
The following table represents a planning level view of the asset data elements in the project for horizontal bridge clearance. The exact table format and attribution will be provided by State upon Notice to Proceed.

Attribute Name	Notes
Collection Date	Date of raw data acquisition
Bridge No	Bridge ID from State Provided Clearance Data
County	County in which bridge is located
NBEB LSC	Left Shoulder Clearance

NBEB LRC	Left Roadway Clearance
NBEB Ln	Field name will be NBEB_L# (Measurement taken at lowest point over each lane present)
NBEB LLD	Left Lateral Distance
NBEB RLD	Right Lateral Distance
NBEB RW	Roadway Width
NBEB RRC	Right Roadway Clearance
NBEB RSC	Right Shoulder Clearance
NBEB MW	Median Width
SBWB LSC	Left Shoulder Clearance
SBWB LRC	Left Roadway Clearance
SBWB Ln	Field name will be SBWB_L# (Measurement taken at lowest point over each lane present)
SBWB LLD	Left Lateral Distance
SBWB RLD	Right Lateral Distance
SBWB RW	Roadway Width
SBWB RRC	Right Roadway Clearance
SBWB RSC	Right Shoulder Clearance
SBWB MW	Median Width

References

The Indiana Department of Transportation has one-page bridge clearance diagram depicting an image, a lidar diagram, and text information (see image below). The one pager opens within the bridge map Arc GIS online [INDOT Bridge Clearance \(arcgis.com\)](https://arcgis.com)



NBI Number: 25250 Bridge Number: 103-33-05149 A Route Type: Interstate Direction: E Location: 03.16 N US 40 Mile Post & Offset: 3+0.133 Facility Carried: SR 103 Features Crossed: I-70 EB Date Collected: 05/28/2020 Minimum Vertical Clearance: 15.37 ft Horizontal Clearance: 40.55 ft Minimum Defense Clearance: 16.96 ft Comments:	
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Disclaimer: Data contained herein are representative of conditions existing at the time of the data acquisition. Site conditions may have changed since then which may make such data presently inaccurate. The blue box shows the practical maximum clearance for a 3-meter width of pavement.

Asset Requirements – Earth Retaining Structure (ERS)

State Will Provide

- Existing TAMS ERS data – file geodatabase or web map service
- Existing greater Minnesota ERS data (AGOL) – file geodatabase or web map service
- Existing Noise wall TAMS data for reference – file geodatabase or web map service
- Additional guidance on asset data elements, including photo examples of earth retaining structure types, upon request.

General Requirements

The reporting of geotechnical systems, systems concerned with rocks and soil, are required by state statute in Minnesota 174.03. Earth retaining structures are one of several geotechnical system classes and are used to hold back the earth and maintain the difference in the ground surface height.



There are nine basic earth retaining feature types at State consisting of Bin, Cantilever, Crib, MSE (Mechanically Stabilized Earth), Gravity, Sheet Pile, Soldier Pile, Soil Nail, Other.

The criteria listed below will be used to determine if an ERS should be inventoried.

- The exposed minimum height above ground is ≥ 4 feet. This height does not include top-of-wall attachments unless they are capable of holding material.
- Face angle ≥ 45 degrees
- Bridge elements should not be included in this project (for example abutment, wingwall, pier structures, under bridge slope paving). Culvert headwalls and wingwalls should not be included in this project.
- If an ERS is located adjacent to a wingwall, start at the joint of the bridge wingwall.

It is understood by the State, utilizing remote sensing asset extraction for earth retaining structure may not capture all ERS locations, for example if the structure is located beneath the roadway.

Extraction Guidance

- Collect points to capture asset roadside polyline. Points shall delineate top surface and toe of structure at every major vertex (direction change) or one point every 50' whichever is more frequent.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Asset Specific Quality Control

- Utilize google street view to mark ERS locations that might be out of sight from the remote sensing imagery or lidar.
- Utilize GIS to smooth out small variations to create smooth polyline

Deliverables

1. Multiple files that meet TAMS data table formatting and import guidelines - .csv or other innovative options/formats determined collaboratively between State and contractor upon notice to proceed.
2. Point locations where additional ERS might exist but remote sensing technology could not be used to identify the asset.

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the ERS inventory. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Earth Retaining Structure Table

TAMS Alias	Metadata Description	Picklists
Geotech Feature	Asset class	picklist
Material	Physical substance of the wall	Picklist
ERS Name	Utilize route number and reference post*	
Comments	Additional information for the wall	
Date of Collection	Date of raw data collection	
Max Wall Height	Measured in feet	
Minimum Wall Height	Measured in feet	
Average Wall Height	Calculated/Measured from Geometry	
Structure Surface Area	Calculated/Measured in SF	
Structure Length	Calculated/Measured in LF	
Features Carried	Written Description	
Features in Front	Written Description	
Route	Associate MN TH	Picklist
Route Type	Classification of Adjacent Roadway	Picklist
Weep holes/ Drain Headwall	X,Y, Z Location and size wall drain location	

*A ERS naming convention guide will be given to the contractor upon Notice To Proceed

Asset Project Requirements – Hydraulic Infrastructure (HYDI)

State Will Provide

- Existing GIS data of Hydraulic Structures with a current TAMS record including, at minimum, the following attribution, TAMS ID, Structure Type, Roadway Type, Last Date Inspected, Date Update, XY Location, XY Location Source.

General Requirements

Collect and conflate 3 hydraulic asset types: catch basins, drop inlets, and manholes.

1. **Catch Basin Inlet Type:** Found along a curb line.



2. **Drop Inlet Type:** Round concrete or metal grate found in medians and ditches surrounded by vegetation.



3. **Manhole Inlet Type:** Round all metal or metal with small holes cover surrounded by pavement not along a curb line. Can be found in driving lanes (may not differentiate storm from sanitary/utility from surface scan)



Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Extraction Guidance

- Point extraction at structure center of casting.
- Upon conflation with current TAMS records, provide attributes as stated in the data dictionary and keep TAMS ID.

Quality Control

- Validate attribution, existence, and location with imagery and existing data.
- Address obstruction mitigations (such as parked cars or other visual barriers).
- Only remove existing hydraulic assets if there is a clear unobstructed view.

Deliverable

1. Attributed structure data in a format consumable for TAMS in accordance with the data dictionary for hydraulic structures - GIS location data in .CSV

Data Dictionary

The data dictionary table below represents hydraulic infrastructure asset data elements.

Attribute Name	Metadata
Collection Date	Date surveyed
Structure Type	Catch Basin, Drop Inlet, Manhole
TAMS ID	<i>For hydraulic structure with a current TAMS record</i>
Roadway Type	Mainline, Side Road, Ramp/Loop
Longitude	Coordinates at center of casting
Latitude	Coordinates at center of casting
Status	Inplace, Removed

Asset Project Requirements – Linear Roadway Surface (LROAD)

State Will Provide

- Existing centerline data - TBD
- Existing edge of pavement linear asset – file geodatabase

General Requirements

Linear roadway asset information is used for multiple purposes at State, including but not limited to linear referencing (storing geographic locations by using relative positions along a measured linear feature), Geographic information system (GIS), roadway surface ownership system size computations, and measuring and defining section begin/end length information for maintenance activities like snow and ice.

The linear roadway surface asset information included in this requirement is the

- centerline of the roadway as defined by extraction guidance below and
- the edge of pavement on both sides of the roadway.
- paved or unpaved shoulder width and material type

Linear roadway asset information is stored and managed in ESRI Roads and Highways as events on the centerline of the roadway. Please refer to the ESRI website for more information.

<https://www.esri.com/en-us/arcgis/products/arcgis-roads-highways/overview>

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

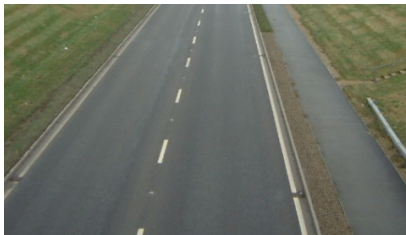
Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Extraction Guidance

Linear roadway centerline and edge of pavement will be conflated with ESRI Roads and Highways Linear Referencing System data and/or system size data.

Centerline extraction methodology falls into undivided, and divided roadways. See photo examples below.

Undivided



Divided



- **Undivided** – roads with divisions of any type that are less than 80 feet in length*, roads with paint stripe tapers regardless of length, roads with double yellow painted centerline and two lane no-passing zones, roads with two-way left turn lanes are all considered undivided. *Unless the segment can be treated as predominately divided – as defined by State
 - a) The centerline will be placed at an equal distance between the pavement marking lines that depict the edge of the legally drivable portion of roadway (fog-line to fog-line). If the undivided roadway is not marked (for example, not paved roads) the centerline will follow the center of the roadway edges.

- **Divided** - roads with multi-lanes curbed or positive barrier median regardless of width or a median that is at least 4 feet wide will be considered divided if the division is at least 80' in length, double yellow painted dividing lines that continuously connect two positive barriers will also indicate a divided road segment if the total length including the two positive barriers is at least 80' long, non-contiguous raised "islands" between roadways will be aggregated (treated as predominate) and considered continuous divided, impenetrable vegetation separating roadways is considered divided, roadways on separate bridges are considered divided, one-way-couplets where roadways are separated by a city block are considered divided in those areas.
 - a) For Divided roads with 1 lane each direction the LRS centerline will be placed at the center of the drivable through lanes (mainline) in both directions.
 - b) For divided roads with more than 1 lane in each direction the centerline would be between the outermost, the lane closest to the right shoulder, through lane and the adjacent through lane (for example, a road with 2 lanes going in each direction, the centerline would follow the hashed white stripes).

Linear roadway edge of pavement extraction follows the edge of paved surface. The edge of pavement continues through intersections as shown below.



Asset Specific Quality Control

- Utilize GIS tools like smoothing to correct any irregular linework.
- Flag areas in question that don't fit into extraction guidance.
- Modify existing linear extraction if it was done incorrectly.

Deliverables

1. New and/or modified line geometry of the roadway centerlines – TBD based on LRS
2. New and/or modified line geometry of the edge of pavement – TBD based on LRS
3. Shoulder width and material types – TBD based on LRS

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the linear roadway surface inventory. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Linear Centerline (polyline)

LRS Column_ID	Metadata Description	Picklists
ROUTE_ID	18-digit LRS Route ID	Picklist
ROUTE_NAME	Route Name + I or D	Picklist
ROUTE_LABEL	The route name	Picklist
ROUTE_SIGN_LABEL	The route label that is signed in the field	Picklist
ROUTE_SYSTEM		Picklist
GNIS_FEATUREID	Geographic Names Information System (GNIS) https://www.usgs.gov/faqs/what-geographic-names-information-system-gnis	Picklist
ROUTE_NUMBER	The number designated to the route	Picklist
ROUTE_SUFFIX	Designates the type of highway	Picklist
TRAFFIC_DIRECTION	The direction traffic flows	Picklist
ROUTE_SIGNING	The route number that is physically signed	Picklist
OWNERSHIP	Owner of the route or roadway	Picklist

Linear Roadway Edge of Pavement Table (polyline)

LRS Column_ID	Metadata Description	Picklists
ROUTE_ID	18-digit LRS Route ID	Picklist
FROM_MEASURE	From LRS route measure	
TO_MEASURE	To LRS route measure	
BASIC_PAVEMENT_TYPE	Description of surface material of pavement	Picklist
SHOULDER WIDTH	The distance across the shoulder	

Asset Requirements - Noise Wall (NOISEW)

State Will Provide

- Existing TAMS data – file geodatabase or web map service
- Additional guidance on asset data elements, including photo examples of noise wall types, upon request.

General Requirements

There are eight basic noise wall types at State consisting of multiple primary material components. The noise wall types are acrylic, concrete block wall, concrete panel wall, concrete post/concrete panel, concrete post/wood panel, steel wall, wood glulam wall, glulam panel, and wood post/wood panel.

The reporting of noise wall inventory data is required every two years by Federal Highway Administration. Several of the data elements shown in the Noise Wall Data Table are required for this project and to meet the National reporting requirements.

Extraction Guidance

- Noise walls that are new or modified should be included in asset extraction.
- Extract noise wall locations at the base of the wall.
- For each wall, extract a noise wall surface area from the wall face. Place the calculated surface area result in the wall area attribute (see Noise wall Table below).

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Asset Specific Quality Control

- Utilize GIS tools like smoothing to correct any irregular or zig zag linework.

Deliverables

1. Multiple files that meet TAMS data table formatting and import guidelines - .csv.

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the noise wall inventory. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Noise Wall Table

COLUMN_ID	TAMS Alias	Metadata Description	Picklists and Project Notes
mms_roadway_type_name	Route Type	Category of primary roadway nearest to noise wall	picklist
wall_location	Detailed Wall Location	Written description of noise wall's location	
wall_length	Length Feet	Measured length of noise wall (in feet)	
wall_height	Average Ht Feet	Average height of noise wall (in feet)	
wall_area	Area Sq Ft	Total approximate surface area of wall	
wall_post_material_name	Post Material	Construction material of noise wall's posts	picklist
wall_panel_material_name	Panel Material	Construction material of noise wall's surface panels	picklist
panel_surface_texture_name	Panel Surface Texture	Description of noise wall's surface coating	picklist
wall_batten_material_name	Batten Material	Primary material of connective structures (battens) between wall panels	picklist
wall_panel_cap_material_name	Panel Cap Material	Material of topmost portion of concrete wall panels	picklist
batten_to_panel_connection	Batten to Panel Connect.	Connection method between wall panels and connective battens	picklist
cap_to_panel_connection_name	Cap to Panel Connect.	Connection method between wall panels and caps	picklist
panel_to_post_connection_name	Panel to Post Connect.	Direct connection method between wall panels and posts	picklist
panel_to_panel_connection_name	Panel to Panel Connect.	Direct connection method between two wall panels	picklist
retire_date	Retire Date	Date of noise wall's retirement (if status is not active)	
foundation_name	Foundation	Distinguishes between noise walls that are built on ground vs. built on another (e.g. ERS) structure (blank in inventory)	picklist
user_update	User Update	Most recent TAMS user to update/alter inventory record	
date_update	Date Update	Date of most recent alteration to inventory record	
asset_geomsrsrc_name	Asset Geometry Source	The source of the structure's spatial location data	picklist
comment_str	Comments	General comments on structure	

Asset Project Requirements – Roadway Markings (RMARK)

State Will Provide

- Existing TAMS data – file geodatabase or web map service

General Requirements

Roadway markings consist of paint or special material installed on paved roadways that provide guidance and information to pedestrian and drivers. The main two categories are messages and long-lines.



Extraction Guidance

Extract a point at the center of the message. Include painted islands as messages. Extract in the center of the long line. Include paint stripes on shoulders as well.

If the strip is recessed and the capture technology/process captures that information, complete the attribute as shown in the planning table below.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Asset Specific Quality Control

- It is a priority to utilize existing TAMS data for material type. If the material type is known and remains the same. Flag any records where conflation of existing material type has occurred. State will review the information as well as provide direction to the contractor on typical material installation locations to verify the records.
- Flag any gaps in striping data outside of intersections and check the gaps to verify completeness of the data.

- Flag any gaps where there are not pavement messages at the intersection of local roadways and interstate ramps with turning lanes, as shown in the photo above.

Deliverables

1. Multiple files that meet TAMS data dictionary tables format below and import guidelines that will be determined by MnDOT after project kick-off meeting - .csv

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the roadway messages and long lines. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Roadway Markings Striping (Long Lines) Table

COLUMN_ID	TAMS Alias	Metadata Description	Picklists and Project Notes
_NUMBER	SP Number	Displays the Primary State Project Number	<i>If applicable, provided by MnDOT</i>
ROUTE_NUMBER	Route Number	Displays the route number with system type.	<i>Picklist from TAMS</i>
DIRECTION	Direction of Travel	Direction of travel on roadway according to reference point.	<i>Increasing or Decreasing</i>
PVMT_LENGTH_INSTALL	Miles of Paint	Displays the number of miles a pavement marking is installed (not centerline miles, but actual length of marking).	<i>Calculated Value</i>
PVMT_LINE_WIDTH	Line Width	Value in inches	Picklist from TAMS
PVMT_RECESSED	Recessed?	Displays if the stripe has been installed using a groove inlay	Picklist from TAMS; Yes or no
COMMENT_STR	Comments	Displays commentary about the roadway or installation process.	
USER_UPDATE	User Update	Displays the name of the last user that updated the TAMS record.	

Roadway Marking Messages Table

COLUMN_ID	TAMS Alias	Metadata Description	Picklists and Project Notes
COMMENT_STR	Comments	Displays commentary about the roadway or installation process.	
DATE_UPDATE	Date Update	Displays the date of the last record update.	
DISTRICT_ID	District	District that asset is located and managed by	<i>TAMS picklist provided</i>
MMS_SP_NUMBER	Built SP Number	Displays the Primary State Project Number	<i>If applicable, provided by MnDOT</i>
PVMT_MESSAGE_CLASS_CODE_ID	Pvmt Message Class Code	The type of pavement message material	<i>TAMS picklist, "Unknown" for all remote sensing acquisition</i>
PVMT_MESSAGE_ID	Pvmt Message		
PVMT_MESSAGE_NAME	Pvmt Message Legend	Displays what the message is for the driver	<i>TAMS picklist provided</i>
USER_UPDATE	User Update		

Asset Requirement - Pedestrian Infrastructure (PED)

State Will Provide

- Existing pedestrian infrastructure data – file geodatabase or web map service
- Sample pictures and training material as needed - .pdf
- A sample size of field obtained slope measurements to utilize for quality control - TBD

General Requirements

Curb ramps, sidewalks, pedestrian push buttons, sidewalk obstructions, bus stops, and pedestrian crossings are the categories of pedestrian infrastructure included in the project. Pedestrian infrastructure asset data will include the acquisition of both inventory and compliance data for reporting purposes.

- Utilize the following Standard Plans, Details, and website to assist with the identification and attribution of pedestrian infrastructure
 - State Americans with Disability (ADA) design guidance
<http://dot.state.mn.us/ada/design.html>
 - Curb Ramp Standard Plan 5-297.250 <http://dot.state.mn.us/ada/pdf/5-297-250.pdf>
 - Sidewalk and Driveway Standard Plan 5-297.254
 - Pedestrian push button station detail
<http://dot.state.mn.us/ada/pdf/Signal%20Detail.pdf>
 - Signal Plan Guidance
<http://dot.state.mn.us/ada/pdf/signalplanguidance.pdf>

Extraction Guidance

The location point for curb ramps, obstructions, bus stops, and signal poles is placed at the center of the asset. Curb ramp running and cross slopes are measured at the midpoint of the curb ramp. Curb ramp gutter in slope measured perpendicular to the middle of the curb cut from the flow line towards the street. Curb ramp flowline measured from one flare to the other flare.

The polyline for sidewalks is placed in the center of the sidewalk. Sidewalk incremental slope measurements are taken as a related point at a minimum of one perpendicular and parallel measurement per linear feature and then at every 25 feet as space allows.

Accuracy Specifications

Relative accuracy must capture data accurate to report on and measure slope compliance per State ADA Standards <http://dot.state.mn.us/ada/pdf/mndot-ada-standards.pdf>

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Asset Specific Quality Control

- Parked cars will block remote sensing data capture. Describe how this risk will be mitigated and associated quality control measures to capture pedestrian infrastructure inventory and compliance data in an efficient and effective manner. For example, night-time data collection will occur as needed on MN highways through city limits.
- Compare curb ramp and sidewalk slope measurements obtained through remote sensing to a sample size of State field acquired results. Report to the state slope measurements outside of a 0.5% tolerance.

Deliverables

1. Multiple files that meet TAMS data dictionary tables and import guidelines that will be determined by State after project kick-off meeting - .csv
2. A GIS shapefile or geodatabase of non-compliant assets according to Agency ADA Standards (PDF) and the reason for the non-compliance.
<http://dot.state.mn.us/ada/pdf/mndot-ada-standards.pdf>

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the curb ramp inventory table, sidewalk inventory table, sidewalk slope table, sidewalk condition table, automated push buttons, and pedestrian crossings. The exact table formats and attribution, set-up tables, and metadata will be provided by State upon Notice to Proceed. *TBD if included in the project.

Pedestrian Curb Ramp Inventory Table

TAMS Alias	Metadata Description	Picklists
Comments	Any additional information for the record	
Curb Ramp Type	Type of Pedestrian Curb Ramp	CURB_RAMP_CLASS_CODE
Landing Area Type	Pedestrian Landing Area Type	SETUP_LANDING_AREA_TYPE
Pedestrian Activity Type	Pedestrian Activity Type	SETUP_PED_ACTIVITY
Pedestrian Location Type	Pedestrian Location Type	SETUP_PED_LOCATION_TYPE
Ramp Width (in)	Width of the ramp in inches	
Retirement Date	Date taken out of service	

Pedestrian Curb Ramp Inspection Type Table

TAMS Alias	Metadata Description	Picklists
Comments	Any additional information for the record	
Curb Ramp	Unique Curb Ramp Name	From Ped Curb Ramp Inventory
Built SP Number	State Project Construction Number Asset Added or Modified	
Inspection Date	Date the asset was evaluated	
Inspector Name	The person or consultant performing the evaluation	

Pedestrian Curb Ramp Compliance Table

TAMS Alias	Metadata Description	Picklists
Pedestrian Ramp Condition ID	Unique Compliance Record	
Is Curb Ramp Component Fully Compliant	According to State ADA Office requirements is the curb ramp compliant	Yes or No
Truncated Domes	Are truncated domes installed	Yes or No
Vertical Discontinuities Compliant	According to State ADA Office requirements does curb ramp meet vertical discontinuities compliance	Yes or No
*Compliance with Spec 2521.3	According to State ADA Office requirements is curb ramp compliant with State specification 2521.3	Yes or No
*Built to Plan?	According to State ADA Office requirements is curb ramp built according to plan	Yes or No
*Curb Ramp Condition Rating	Material evaluation according to State ADA Office requirements	Upon notice to proceed
*Gutter Condition Rating	Material evaluation according to State ADA Office requirements	Upon notice to proceed
Comments	Any additional information for the record	

Pedestrian Ramp Slope Table

TAMS Alias	Metadata Description	Picklists
Curb Ramp Slope Evaluation ID	Unique ID for each slope evaluation	
Slope Description	Type of slope being evaluated	Cross, Running
Measurement 1 (%)	Slope in percent	
Measurement 2 (%)	Slope in percent	
Measurement 3 (%)	Slope in percent	
Comments	Any additional information for the record	

Pedestrian Ramp APS Table (Point)

TAMS Alias	Metadata Description	Picklists
Curb Ramp Signal ID	Unique ID for each curb ramp signal evaluation	
APS Tone	Type of APS Signal Sound	Picklist
Button Back of Curb	Indicate if the push button is on the back of curb	Yes or No
Button Distance Apart	The distance between buttons	
Button Height (in)	The height of the button	
Button Horizontal Offset	The offset from the PAR to the button	
Button Landing Area	The length times width of landing area	
Button Landing Slope Parallel	Slope in percent	
Button Landing Slope Perp	Slope in percent	
Button Orientation	The way the button is oriented	Picklist
Button Side Reach	Distance if the button is reached from the side	
Connected to PAR	Indicated if the push button is connected to the pedestrian access route (PAR)	Yes or No
Countdown Display	Indicated if the countdown is displayed	Yes or No
Pedestrian Phase	Indicate if the APS has a pedestrian phase	Yes or No
Comments	Any additional information for the record	

Pedestrian Ramp Crossings Table (Point)

TAMS Alias	Metadata Description	Picklists
Curb Ramp Crossing ID	Unique record number ramp crossing record	
Is Crossing Fully Compliant	According to State ADA Office requirements is the curb ramp compliant	Yes or No
Crossing Width (ft)	The length across the crossing in inches	
Marked Crossing?	Does the crossing contain roadway markings	Yes or No
PAR Cross Slope (%)	Slope in percent	
PAR Running Slope (%)	Slope in percent	
Pavement Condition Rating*	Visual structural evaluation of pavement within the crossing	picklist
Type of Marking	What is the name of the pavement marking	picklist
Is Ped Ramp within Crosswalk?	Indicate if the pedestrian ramp aligns with crosswalk and falls between markings	Yes or No
Comments	Any additional information for the record	

Sidewalk Inventory Table

TAMS Alias	Metadata Description	Picklists and Project Notes
Boulevard Material Type	Sidewalk material	SETUP_BLV_D_MATERIAL
Boulevard Width (in)	Sidewalk width	
Comments	Any additional information for the record	
District	Get District from boundary shapefile	SETUP_DISTRICT
Driveway Signal	If a signal system is located within this sidewalk	SETUP_YES_NO_NA
Driveway Type	If a driveway is located within this sidewalk	SETUP_DRIVEWAY_TYPE
Pedestrian Activity Type	General type of activity occurring along the block being recorded	SETUP_PED_ACTIVITY
Thru Route	A State route adjacent to the sidewalk.	SETUP_SGL_THRU_ROUTE
Sidewalk Type	The type of sidewalk	SIDEWALK_CLASS_CODE
Is Sidewalk Section Compliant?	According to State ADA Office requirements is the curb ramp compliant	
Sidewalk Material Type	Material Type	SETUP_SIDEWALK_MATERIAL

Sidewalk Inspection Type Table

TAMS Alias	Metadata Description	Picklists
Inspection Type	A picklist of different inspection description types	Picklist
Sidewalk Name	Unique Sidewalk Name	From Sidewalk Inventory
Built SP Number	State Project Construction Number Asset Added or Modified	
Inspection Date	Date the asset was evaluated	
Inspector Name	The person or consultant performing the evaluation	
Comments	Any additional information for the record	

Sidewalk Slope Table (Point)

TAMS Alias	Metadata Description	Picklists and Project Notes
Cross Slope ID	Unique record of sidewalk cross slope	
Slope Type	Type of slope being evaluated	
Cross Slope (%)	Slope in percent	
Running Slope (%)	Slope in percent	
Width (in)	The length across the sidewalk in inches	
Sidewalk Condition*	Visual structural evaluation of the sidewalk	Picklist
Apron Condition*	Visual structural evaluation of the apron	Picklist
Curb Condition*	Visual structural evaluation of the curb	Picklist
Curb Height	The height of the curb attached to the sidewalk	
Comments	Any additional information for the record	
Recommended Action*	Future maintenance or construction activities requested	Picklist

Sidewalk Obstruction Table (Point)

TAMS Alias	Metadata Description	Picklists
Obstruction ID	Unique record of sidewalk obstruction	
Obstruction or Structure Type	Description of the object	Picklist
Depth (ft)*	The obstruction distance into the sidewalk	
Elevation Difference (ft)*	If applicable, measure the difference between the sidewalk elevation and end of the obstruction elevation.	
Max Trip Hazard Height (in)	The obstruction trip hazard height	
Step Height (ft)	If the obstruction is a step, measure the height	
PAR Width (ft)	Pedestrian Access Route (PAR) length across the sidewalk	
Number of Steps	Count how many steps are present	
Recommended Action*	Future maintenance or construction activities requested	Picklist
Comments	Any additional information for the record	

Sidewalk Bus Stop Table (Point)

TAMS Alias	Metadata Description	Picklists
Bus Stop ID	Unique record of bus stop	
Bus Stop Type	Description of the bus stop	Picklist
Boarding Area	The length times width of where passengers board	
Boarding Area Length (ft)	The length across the roadway from end to end of boarding area	
Boarding Area Width (ft)	The length from the roadway to the end of boarding area	
Boarding Slope Parallel (%)	Slope in percent	
Boarding Slope Perpendicular (%)	Slope in percent	
Bus Stop Condition Rating*	Visual structural evaluation of bus stop	Picklist
Recommended Action*	Future maintenance or construction activities requested	Picklist
Connected to PAR	Indicate if the bus stop is connected to the Pedestrian Access Route (PAR)	Yes or No
Comments	Any additional information for the record	

Asset Project Requirements – Roadside Barriers (RBARR)

State Will Provide

- Existing TAMS data – file geodatabase or web map service

General Requirements

Longitudinal barriers, end terminals, bridge termini, concrete barriers, and crash cushions are the general categories of roadside barriers included in the project.

- Utilize the State Roadside Hardware Identification and Inspection handbook to assist with the identification of longitudinal, end terminals, and crash cushions.
<http://www.dot.state.mn.us/design/roadsidesafety/links.html>
- Utilize the Standard Plans and Plates to assist with the identification of barriers that transition to bridges and concrete barrier [MnDOT Roadside Safety \(state.mn.us\)](http://www.dot.state.mn.us/design/roadsidesafety/links.html)
- Match the Transportation Asset Management System (TAMS) current data structure. The complete data structure will be provided upon notice to proceed but for project planning purposes, a brief introduction of the TAMS structure is provided here. TAMS contains two primary tables for roadside barriers the Termini Table and Linear Barrier Table.
 - Within the Termini Table are the following class codes, cable anchor, crash cushion, end terminal, and transition. In addition, each class code has a corresponding termini category type. For example, crash cushions have options like smart cushion, bullnose, CAT-350, etc. as well as a termini subcategory type.
 - Within the Linear Barrier Table are the following class codes, box beam, cable, concrete, other, plate beam. In addition, each class code has a corresponding category type and sometimes a subcategory. For example, cable class codes have a category type high tension or low tension as well as linear barrier cable high tension subcategory Brifen, Gibraltar, etc.
 - The list of domains in TAMS has not been updated since 2019 and may not contain the most current list of category types or subcategory types.

Extraction Guidance

Extract polyline along the top center of the concrete roadside barriers at start and end of designed system and at appropriate intervals on curves to meet asset requirements.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Asset Specific Quality Control

- Utilize GIS tools like smoothing to correct any irregular linework.

Deliverables

1. Multiple files that meet TAMS data dictionary tables format below and import guidelines that will be determined by State after project kick-off meeting - .csv

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for termini and linear barrier. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Termini Table

COLUMN_ID	TAMS Alias	Metadata Description
comment_str	Comments	General comments concerning the end treatment/attenuator
tb_barrier_height	Height of Barrier	Height to top of longitudinal barrier in inches
tb_barrier_offset	Barrier Offset	Horizontal distance (unit unknown) from barrier to nearest lane of nearest statutory route (blank in inventory)
tb_block_out_depth_name	Blockout Depth	Horizontal depth of blockouts in inches (the most common blockout if multiple configurations are present)
tb_block_out_type_name	Blockout Type	Material of blockouts (the majority if mix of wood and plastic)
tb_curb_height_name	Curb Height	Height in inches from gutter line to top of curb
tb_et_throat_size_name	Throat Size	Dimension for throat end of terminal head - applicable to ET Plus end terminals only
tb_install_loc_name	Installed Location	Location of end treatment with respect to pavement/shoulder
tb_post_fin_name	Remaining Post	Material of posts from 3rd onward
tb_post_one_name	Post 1	Post 1 material/design
tb_post_two_name	Post 2	Post 2 material/design
tb_post_type_name	Post Type	Predominant post material (may be redundant with 'Remaining Posts')
tb_tcat_type_name	Termini Category Type	Specific model/type/brand of installed end treatment
tb_term_orient_name	Termini Orientation	Direction of end treatment with respect to nearest direction of traffic
tb_termini_class_code_name	Termini Class Code	Functional/base category of installed end treatment
tb_termini_ID	Termini ID	Unique TAMS inventory identifier (unique long integer)
tb_termini_name	Termini Name	Descriptive name referencing route, mile reference post, and longitudinal offset from that post
asset_status_name	Asset Status	Status of end treatment.
tb_tsubcat_type_name	Termini Subcategory Type	Most specific type/model/brand classifier for end treatment

Linear Barrier Inventory Table

COLUMN_ID	TAMS Alias	Metadata Description
traf_barrier_name	Linear Barrier Name	Descriptive name referencing route, mile reference post, and longitudinal offset from that post
traf_barrier_status_name	Linear Barriers Status	Status of traffic barrier
traf_barrier_class_code_name	Linear Barrier Class Code	Most general functional category of traffic barrier
tb_lbcats_type_name	Category Type	Secondary functional category of traffic barrier
tb_lbsubcat_type_name	Subcategory Type	Tertiary functional category of traffic barrier
tb_install_loc_name	Installed Location	Location of barrier with respect to pavement/shoulder
tb_curb_height_name	Curb Height	Height in inches from gutter line to top of curb (if present)
tb_barrier_height	Height of Barrier	Height in inches from ground to top of barrier
tb_post_spacing	Nominal Post Spacing	Distance in feet from center of one post to the next
tb_block_out_type_name	Blockout Type	Material of post-to-rail blockouts (if barrier is not cable)
tb_block_out_depth_name	Blockout Depth	Horizontal depth of blockouts in inches (the most common blockout if multiple configurations are present)
tb_post_type_name	Post Type	Material of barrier's post (predominant material, if more than one)
length	Length	Measured length (in feet) of linear barrier
tb_cable_num	# of Cables	Number of cables for high- and low-tension cable barrier
tb_line_post_name	Line Post Type	Material & configuration for post in the mainline run (not the end posts)
tb_anchor_post_up_name	Upstream Anchor Post	Material & configuration for post at end facing into traffic
tb_anchor_post_dn_name	Downstream Anchor Post	Material & configuration for post at end following direction of traffic
comment_str	Comments	General comments/notes on asset

Asset Project Requirements – Rumbles (RUM)

State Will Provide

- Existing rumble linear referencing datasets (2) – TBD
- Existing linear referencing centerline data - TBD

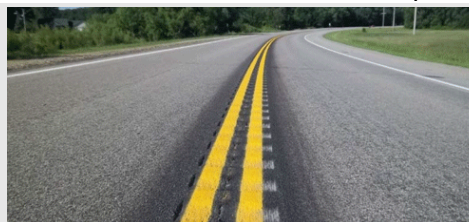
General Requirements

Rumble strips create grooves or rows of indent in the pavement and are essential roadway safety features. Some strips are placed in alignment with roadway striping. These are called rumble strips. The following images depict the different types.

Edgeline Rumble Stripe



Centerline Rumble Stripe



Centerline Rumble Strip



Shoulder Rumble Strip



- Refer to the State Traffic Engineering website for more information
<https://www.dot.state.mn.us/trafficeng/safety/rumble/index.html>
- State rumble strips and stripes are managed as route events within ESRI Roads and Highways. Please refer to the ESRI website for more information.
<https://www.esri.com/en-us/arcgis/products/arcgis-roads-highways/overview>

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Extraction Guidance

To import the rumbles data into ESRI Roads and Highways, it must be extracted as 3 distinct layers based on the location of the rumble: Centerline of roadway – located in the middle of the roadway, Edgeline of roadway – located at or near driving lane pavement marking edge), on

shoulder strip – located past the pavement edgeline within paved portion of roadway reserved for emergencies and not considered the legal driving lane.

Collection Polyline at start and end locations of rumble strips; for curves at appropriate interval to show curvature may be computer generated. Breaks for city limits are considered starting and ending points. Breaks for intersections and other entrances are not considered starting and ending points

Rumble offset is measured from the nearest pavement marking to inner edge of rumble at start of rumble, then check measurements at visible and sustained deviations.

The two shapes of rumbles are shown below. Taken from the State Youtube.com video <https://www.youtube.com/watch?reload=9&app=desktop&v=W3-uPGb1nmM>



Rumbles are either continuous or intermittent. The rumble is continuous if it only breaks for intersections and access points (for example, driveways). The rumble is intermittent if the rumble stops and then starts again with the gaps being less than 12 feet in length.

Quality Control

- Utilize GIS tools like smoothing to correct any irregular linework.
- Flag areas in question that don't fit into extraction guidance.

Deliverables

1. Rumble centerline, conflated LRS layer
2. Rumble edgeline, conflated with LRS layer
3. Rumble on shoulder strip, conflated with LRS layer

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the rumble assets. The exact table formats and attribution, set-up tables, and metadata will be provided by State upon Notice to Proceed.

Centerline Table, Edgeline Table, On Shoulder Table

Attribute Name	Notes	Picklist
LRS Route ID	Route in LRS format	Picklist
LRS Carto Begin	Begin point	
LRS Carto End	End point	
Segmentation	Continuous or intermittent	Picklist
Shape	Rectangular or Sinusoidal	Picklist
Width	The distance across the rumble	
Offset	The category of distance from centerline <1', 1'-3', or >3'	Picklist

Asset Project Requirements – Safety Data (SAFETY)

State Will Provide

- Roadway locations where safety data is obtained.

General and Extraction Requirements

Minnesota is committed to Toward Zero Deaths, a cornerstone program aimed to reduce traffic related crashes in the state of Minnesota. Roadway safety asset data and roadway characteristics are critical information used in making sound decisions on the safety performance of roadways and reducing traffic crashes.

This requirement is aimed to identify safety asset data and characteristics (and the location of the data) that do not meet national and/or department design standards through innovative collection techniques on a network level through asset-grade remote sensing technology utilizing accuracy specification below. ***If any of the information is proposed to be extracted using survey-grade data capture with ground control targets collection or boots on the ground collection, it will not be included in the contract and should not be included in the cost proposal.***

The following safety data is proposed for this pilot extraction asset:

- Flagging of insufficient stopping sight distance, passing sight distance, and decision sight distance according to department design standards.
- Flagging of longitudinal slopes (%), cross-slopes and superelevation (%), and degree or radius of horizontal curvature and length that do not meet department design standard. Detect and report flat spots that can impact drainage and roadway safety.
- Flagging of obstacles such as terrain, vegetation, barriers, signs, and other roadway assets within the clear zone of the roadway surface, including the location of the object (route and reference point), object type, side of the road, distance from the edge of the travel lane and the length of the object if linear (e.g., guardrail). Utilize the State State Aid Clear Zone website for more information on definition of clear zone and best practices and policies. <https://www.dot.state.mn.us/stateaid/clear-zone.html>
- Extraction of approach grades for driveways, public roadways that intersect state routes.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes.

Asset Specific Quality Control

- Describe specific quality control measures for safety data.

Deliverables

1. To be determined by State after project kick-off meeting - .csv and shapefile

Asset Attribution

The exact attribution will be determined upon notice to proceed. The general and extraction section above describes the general overall data collection efforts.

Asset Requirement – Sidewalk Gaps (SWGAP)

State Will Provide

- Existing sidewalk gap data if applicable – ESRI feature class

General Requirements

Pedestrian facilities along and across the trunk highway system are vital components of State's statutory commitment to transportation in Minnesota. Identifying areas where sidewalks are not concurrent and filling sidewalk network gaps is a key action item to that supports pedestrian facility development and people walking.

Sidewalk gaps identification should be completed after the pedestrian inventory and conflation has been completed. Sidewalk gaps are identified based on the pedestrian inventory.

- The [Statewide Pedestrian System Plan](#) (March 2021) gives more information on the State framework to create safe, convenient, and desirable walking for all.
- Sidewalk gaps for this requirement are defined as missing sidewalk or side path facilities at or less than ½ mile in length based on State's pedestrian inventory.

Extraction Guidance

Extract sidewalk gaps within State Rights of Way.

The polyline is created for each gap by placing line in the center of the existing sidewalk or side path and extending that polyline in a typical sidewalk path to the other existing sidewalk. The extraction guidance should be discussed and refined upon notice to proceed.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found.

Thematic accuracy - 98% of recognized asset have correct attributes.

Asset Specific Quality Control

- Flag non-linear sidewalk gaps categorize by intersection type and get feedback from State to get most accurate gap footprints for planning purposes.

Deliverables

1. Sidewalk gap dataset – shapefile with datum WGS84

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the sidewalk gap data. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Sidewalk Gap Table

COLUMN_ID	Metadata Description
Date of Collection	Field collection date
Gap Length	The length of the sidewalk gap from begin to end of the polyline
Flag	The record has been flagged for further review by State
Comments	Any comments about the record.

Asset Project Requirements – Sign Clearance (SCLEAR)

State Will Provide

- Existing Sign Clearance Asset Data – file geodatabase
- Existing TAMS overhead sign (type group O only) – file geodatabase

General Requirements

Overhead mounted sign structures installed on MnDOT roadways must be installed at a height higher than the legal height of commercial vehicles. Measuring the clearance between the lowest point of the structure and the roadway surface provides valuable information for future project planning as well as oversize/overweight permitting. Utilize the following websites to obtain more information.

- The MnDOT Traffic Engineering website describes both the legal height for vehicles as well as typical clearance for overhead mounted signs.
<https://www.dot.state.mn.us/trafficeng/signing/signingspecs.html#:~:text=Clearance%20below%20bridges%20on%20freeways,is%2017%20feet%2C%204%20inches.>
- MnDOT oversize/overweight permits are required when vehicle and load dimensions exceed certain width or height or length or weight according to
<https://www.dot.state.mn.us/cvo/oversize/determine.html>

Extraction Guidance

Overhead mounted sign clearance is the distance from the pavement surface, including shoulders, to lowest point of the structure within each travel lane.

Each measured clearance value should have an associated GPS point.

Conflate TAMS overhead sign structure names for each clearance value on existing structures.

Categorize clearance values into 3 categories: green, yellow, and red.

- Green = > 20 feet
- Yellow = 20 feet – 18 feet
- Red = <18 Feet

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Asset Specific Quality Control

- Report how many overhead clearance data attributes were changed.
- Flag clearance values below 17 feet 4 inches and notify State immediately.

Deliverables

1. Updated AGOL permit tool dataset – shapefile
2. Updated TAMS overhead sign structure clearance dataset - TBD

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for overhead sign clearances. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Sign Clearance Table

COLUMN_ID	Metadata Description
Date of Collection	<i>Date of field collection</i>
TAMS Sign Name	The overhead sign structure name, for example 169-01
Clearance Value	0.1 feet
Category	Indicates clearance categories to help depict the sensitivity to changes in pavement surface.

Sign Panels and Supports (SIGN)

State Will Provide

- Existing TAMS data – file geodatabase or web map service
- TAMS Sign Library Sign Panel Codes - .csv

General Requirements

Panel coding must be completed according to:

- State Sign Panel Library Coding Manual
<https://www.dot.state.mn.us/trafficeng/signing/doc/sign-panel-library-coding-manual.PDF>
- State Standard Sign and Markings Summary
<http://www.dot.state.mn.us/trafficeng/publ/signsmanual/index.html>
- State sign panel library codes must be assigned to field inventory records. The Contractor will partner with State to determine the best process to handle sign codes that are not in the TAMS sign library. For example, if the sign panel does not exist within the sign library, the contractor will create a spreadsheet of signs that need codes, using a generic “Legacy” sign code but including attributes such as route, control section, travel direction, reference post and offset, and the description and size within the Sign Description field in TAMS. The State will assist in the identification of any non-standard sign panels discovered by the Contractor during this .

Extraction Guidance

The point is placed at the base of sign support. If multiple supports exist, the left is marked. Place point at base of support on the right side of the increasing direction.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found. On intersecting local streets outside of State Rights-of-Way, modify signs that already exist within the TAMS database and collect all signs within 50 feet of the intersection on cross-streets (stop, keep right, do not enter, etc.) and all green guide signs and JCT marker signs in advance of the intersection. Signs captured outside State ROW should be flagged for State review. Roundabout signing outside State ROW may have special maintenance agreements with local entities and State feedback is very important in these areas.

Thematic accuracy - 98% of recognized asset have correct attributes.

Asset Specific Quality Control

- It is a priority to obtain sign base types for square tubing. The state will provide a chart that shows the riser post size and sign base type based on panel size for square tube sign supports. This chart can determine the base type for square tube supports in addition to knowing if the support is on concrete or soil. If the sign base type cannot be seen using remote sensing, utilize the chart to add in any missing fields for square tube. There are some situations where the sign base type is designed above recommended chart base type so do not overwrite any existing data.
- In construction project areas where State Project numbers are known, utilize sign plan information as well as field verification to attribute sign base type.

Deliverables

1. Multiple files that meet TAMS data dictionary tables format below and import guidelines that will be determined by State after project kick-off meeting - .csv
2. A statewide dataset at the end of the project that contains exit sign panels and supports (Office of Traffic give guidance on coding) for import to Bentley SUPERLOAD – ESRI feature class.
3. A statewide dataset at the end of the project that contains all reference markers (Office of Traffic give guidance on coding) for ESRI Roads and Highways – ESRI feature class.

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the sign panels, sign supports, and clearances. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Sign Panel Table

COLUMN_ID	TAMS Alias	Metadata Description	Picklists and Project Notes
NAME	Administrative Unit	The State TAMS functional unit responsible for managing the asset from <i>picklist</i> .	For picklist, State will provide upon request.
SIGN_NAME	Panel ID	TAMS system unique auto-integer	Existing records will have this populated and is mandatory if updating existing records; New panel records will need to be tied to the new support using established State practices for uploading deliverables to ensure that the system generates a new Panel ID and correctly ties it to the corresponding Support Inventory record
SUPPORT_NAME	Support ID	TAMS system unique auto-string in Support Table	Existing panel records are populated from the Support Table, and this is mandatory if updating existing records; new panel records will be populated upon import to TAMS (see Panel ID above)
PANEL_CODE	Panel Library Code	This field designates the unique code for the panel design. Auto generated by the system when a sign design is added to the Panel Library from SignCAD and cannot be changed by the user.	For picklist, please refer to: <i>TAMS Sign Library Sign Panel Code Export</i> For correctly identifying the correct sign library design to update existing or new panel inventory records refer to Sign Panel Library Coding Manual

			and Sign Panel library coding examples located at http://www.dot.state.mn.us/trafficeng/signing/plans.html and the State Standard Signs and Markings Manual and Summary located at http://www.dot.state.mn.us/trafficeng/publ/signsmanual/index.html
SIGN_DESCRIPTION	Panel Description	The Legend on the panel in Sign Library Table Panel Description	Auto generated by the system when a panel design is added to the Panel Library from SignCAD and cannot be changed by the user in the Panel Library. Once added to the Panel Inventory the description can be changed for an individual record. Existing and new panel records should be updated to match the legend of the panel in the field
SIGN_CLASS_CODE_ID	Panel Class Code	Sign Panel general grouping from <i>picklist</i> .	<i>Classification of the panel group - Standard is found in the MUTCD/Standard Signs and Markings Summary; Design is a unique panel design: Requester Pay can be a standard or design but installation is paid for by a group outside of MNDOT which includes the logo program.</i>
SIGN_STATUS_NAME	Panel Status	Indicates if the asset is installed on roadway or has been removed from <i>picklist</i> .	Inplace – installed on a roadway. Retired – has been removed or is not found in the field.
DATE_INSTALLED	Panel Install Date	Identifies the date that the current inplace panel was installed and the age of the panel is calculated from this date.	Look for a year of installation sticker on the back sign panel with install year specified and different colors and shapes.
DATE_RETIRED	Panel Retired Date	Date the panel was removed from service.	Add the date when the sign panel was reviewed and not found in the field.
SIGN_COLUMN_POSITION_ID	Panel Column Position	The position of the panel with respect to other panels, in columns from left to right from <i>picklist</i> . State will provide more information for OH and Mast arm sign types.	For example, 01, 02, 03
SIGN_ROW_POSITION_ID	Panel Row Position	The position of the panel with respect to other panels, in rows from bottom to top from <i>picklist</i> .	For example, 01, 02, 03
DIRECTION_ID	Panel Facing Direction	The cardinal direction the sign panel is facing from <i>picklist</i> .	North, South, East, West, Northeast, Southeast, Northwest, Southwest
SIGN_SHEET_TYPE_ID	Panel Sheet Type	The film material on the face of the sign panel from <i>picklist</i> .	Type 11 (DG3, Omni), Type 9 (Diamond, VIP), Type 8 (Diamond LDP), Type 4 (HIP), Type 3 (Hi-I), Type 1 (Engineer, ScotchCal), Digital Type 11, Unknown. Type 11 is universal for panels installed after 2007. Populate based on year. Type 11 if no year visible. Contact State if field is blank for historic data
SIGN_MATERIAL_ID	Panel Material	If the sign material is comprised of multiple panels bolted together then it is extruded (typically only for I-Beam and some Overhead) otherwise it is non-extruded from <i>picklist</i> .	Extruded or Non-Extruded
PANEL_OWNER_ID	Panel Owner	The sign owner from <i>picklist</i> .	STATE, Local Agency, Logo Program, Private/Business, Other. If historic data is "Requester Pay," populate instead with "State"
SIGN_PROJECT	SP Number	The State Project Number that sign was installed or last modified in.	This information should be added when a sign is located within state project limits that were supplied by the state.
SIGN_CONTRACTOR	Prime Contractor	The Prime Contractor that oversaw the state project that the sign was installed or last modified in.	This information should be added when a sign is located within state project limits that were supplied by the state.

SIGN_FABRICATOR_ID	Panel Fabricator	The company that fabricated the sign panel from <i>picklist</i> .	This information should be added when a sign is located within state project limits and was supplied by the state. 3M, Gopher Sign Company, Lightle Enterprises of Ohio, Lyle Signs, M and R, MN State Sign Shop, Newman Signs, Other, Rocal, Safety Signs.
SIGN_MANUFACTURER_ID	Panel Manufacturer	The company that manufactured the sign panel from <i>picklist</i> .	This information should be added when a sign is located within state project limits and was supplied by the state. 3M, Avery, Orafol Americas, Inc.
COMMENT_STR	Comments	Additional Sign Panel information.	Include in the comments the date the sensor data was collected.

Sign Support Table

COLUMN_ID	TAMS Alias	Metadata Description	Picklists and Project Notes
SUPPORT_ID	Support ID	TAMS system unique auto-string in Support Table	Existing support records are populated in the Support Table and this is mandatory if updating existing records; New Support Inventory records will need identified using established State practices for uploading deliverables to ensure that the system generates a new Support ID and correctly ties all panels for the Support Inventory record
GROUND_MOUNT_TYPE_ID	Support Ground Mount Type	The type of fixture at the bottom of the sign structure from <i>picklist</i> .	Other, Omni, 5/16 or 3/8 steel bolts, Cored, 3 Wall Base, Flex Base, Kleen Break, Slip-base concrete, Slip-base ground, Anchors, Median Barrier Plate, If support is U-Channel, populate with 5/16 or 3/8 steel bolts.
SUPPORTS_POSITION_ID	Support Position		Left, Right, Median, Other
LONGITUDE	Latitude		
LATITUDE	Longitude		
SUPPORT_CLASS_CODE_NAME	Support Class Code	Identifies the support group: Ground, I Beam, Other Asset, Overhead. Once selected the Support Type dropdown will populate with the appropriate list for that Support Class Code.	Ground I Beam Overhead Other Asset
SUPPORT_TYPE_GROUP_NAME	Support Type	This identifies the support type. The list available is dependent upon the Support Class Code that is selected. For each support class code, a limited number of support types apply from <i>picklist</i> .	Ground: U Channel, Square Tube, Flex Post, Other I Beam: Unknown Overhead: Bridge Truss, Monotube, Truss (if existing record is Tubular change to Monotube Other Asset: Fence, Light Pole, Gate Arm, Guardrail, Utility Post, Retaining Wall, Noise Wall, Bridge Face, Bridge Pier, Bridge Rail, Signal, Median Barrier, Advanced Warning Flasher, Ramp Meter
SUPPORTS_TYPE_GROUP_NAME	Support Type Group	A categorization of support/panel types from <i>picklist</i> . The selection determines the icon that will populate the map in TAMS.	A, O, SIG, BR, L, D, M, S, R, W, X, OM, SB, E, I ? For definitions refer to State document Signing Map Icons_10-28-2018.xlsx
DATE_INSTALLED	Installed Date	Identifies the date that the current inplace support was installed and the age of the support is calculated from this date.	If blank, use the same install date as panel

SUPPORT_STATUS_NAME	Support Status	Current status of the Support in the field from <i>picklist</i>	Proposed Inplace Retired Void
STRUCTURE_OWNER_NAME	Support Owner	Identifies who owns and/or maintains the support in State right of way from <i>picklist</i>	MNDOT, Local Agency, Logo Program, Private/Business, Other
SUPPORT_TRAVEL_DIRECTION	Support Travel Direction	Identifies the direction of the roadway that the panel message is for (direction entered is the same as the road is signed) from <i>picklist</i>	East, North, South, West
ROUTE_TYPE_NAME	Route Type	Identifies the type of route that the sign is located on from <i>picklist</i>	Frontage Road, Road, Ramp, Local Road, Rest Area, Weigh Station, State Office Building
POST_NUMBER_NAME	Post Number	Identifies the number of posts used to install the support from <i>picklist</i> . This applies to the Support Class Codes Ground, Overhead and I Beam	0, 1, 2, 3, 4, 5
BRACE_NUMBER_NAME	Brace Number	Identifies the number of braces used to install the support. This only applies to the Support Class Codes Ground and Support Type U Channel	0, 1, 2, 3, 4, 5

Asset Project Requirements – Urban Tree and Tree Canopy (TREE)

State Will Provide

- No additional information for this asset

General Requirements

Trees serve an important function on State roadsides and other State managed lands. Trees can provide countless environmental benefits like improved air & water quality, removal of carbon dioxide from the atmosphere, & increased pollinator habitat.

- State’s roadside vegetation Management group has more guidance on tree management <http://www.dot.state.mn.us/roadsides/vegetation/trees.html>
- State’s Environmental Stewardship group has more guidance on planning and design programs <http://www.dot.state.mn.us/environment/planning.html>

In general, trees are defined as a woody perennial plant, typically having a single stem or trunk growing to a considerable height and bearing lateral branches at some distance from the ground. For this asset requirement, a tree is greater than 4 inches in diameter at 4 feet above grade. An urban tree canopy is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

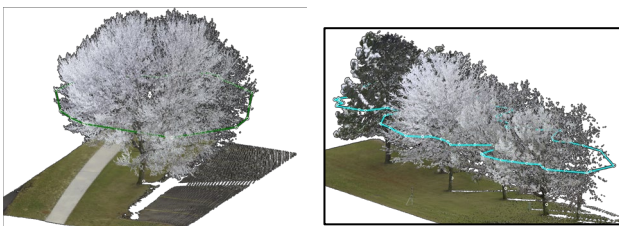
Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Extraction Guidance

Extract tree and urban tree canopy locations within State Rights of Way (ROW) according to Scope of Work Areas. Extract a tree (greater than 4 inches in diameter at 4 feet above grade) point feature at the center base of the trunk. Extract urban tree canopies at 4 feet above grade. See images below of the extracted point to polygon features at approximately 4 feet above grade.



Asset Specific Quality Control

- Knowing where the State Rights of Way (ROW) is located will allow for more accurate State owned tree extraction. The State ROW layer may contain gaps. Flag trees where the tree may or may not be contained within a State ROW because the ROW layer is not available, or construction has occurred, and the ROW layer might be outdated.

Deliverable

1. Tree locations - file geodatabase containing a point feature class of tree base trunk locations, and polygon feature of tree canopy.

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for the Urban tree inventory. The exact table formats and attribution will be provided by State upon Notice to Proceed

Trunk location (point)

Attribute Name	Pick List Values, Units, or Description
Tree Height	Measurement in inches from ground level at base of trunk to top of tree
Tree Diameter	Measurement in inches of the trunk diameter at approximately 4 feet above ground level
Collection Date	Date of raw data acquisition

Urban Tree Canopy (polygon)

Attribute Name	Pick List Values, Units, or Description
Collection Date	Date of raw data acquisition

Asset Project Requirements – Utility Clearance (UCLEAR)

State Will Provide

- Existing Utility Clearance Asset Data – file geodatabase

General Requirements

Above ground utility lines that cross over State roadways must be considered during scoping, design, construction, and maintenance. The location of the utilities and distance above the roadway surface (clearance) may impact construction and maintenance equipment choices. Measuring the clearance between the lowest point of the utility and the roadway surface provides valuable information for oversize/overweight permitting. Utilize the following websites to obtain more information.

- State oversize/overweight permits are required when vehicle and load dimensions exceed certain width or height or length or weight according to <https://www.dot.state.mn.us/cvo/oversize/determine.html>

Extraction Guidance

Utility line clearance is the distance from the pavement surface, including shoulders, to lowest point of the line sag within each travel lane.

Each measured clearance value should have an associated GPS point.

Accuracy Specifications

Positional accuracy - 95% of asset locations have absolute positioning accuracy of <3ft

Relative accuracy – 98% of assets have relative positioning accuracy of <0.1ft

Completeness - 98% assets found

Thematic accuracy (attributes) - 98% of recognized asset have correct attributes

Asset Specific Quality Control

- If there is an obstruction that prevents clearance computation of the full roadbed, please mark those locations.
- Report how many utility clearance data attributes were changed.
- Flag clearance values below 17 feet 4 inches and notify State immediately.

Deliverables

1. Updated AGOL permit tool dataset – shapefile

Asset Attribution

The following tables represent a planning level view of the asset data elements in this project for utility clearances. The exact table formats and attribution will be provided by State upon Notice to Proceed.

Utility Clearance Table

COLUMN_ID	Metadata Description
Date of Collection	<i>Date of field collection</i>
Clearance Value	0.1 feet