Traffic Barriers

Data Collection User's Guide

January 2015

This guide has been prepared for use by the Transportation Development Division in coordination with Technical Services Branch and Roadway Engineering. The information contained in this manual was acquired from a variety of sources. These sources include the links provided throughout the document and the individuals listed below. Sincere gratitude is extended to these individuals for their support in the compilation of this document.

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Introduction

In an effort to monitor inventory condition and asset performance, Oregon Department of Transportation (ODOT) has adopted Asset Management principles for a proactive approach to stewardship of transportation infrastructure. Asset Management is a systematic and strategic approach to maintain, upgrade, and operate physical assets. In order to maximize the benefits of Asset Management, a standardized method of data collection and data processing is needed. This will not only benefit the individual asset managers, but will also create "corporate" data that can be used by all ODOT employees. Commonly understood corporate data will allow for informed decision-making, as well as better communication between asset managers and other ODOT departments (e.g., Maintenance, Construction, GIS). Data collection standards will lay the foundation for a regular cycle of communication about asset needs and conditions.

In January 2007, the draft ODOT Asset Management Region 2 Pilot Report was produced. This report documented experiences over the course of the previous year in collecting, integrating and reporting data about a variety of assets within specific highway segments. The state of available data for the assets included ranged from zero to well-established management systems. Research was done to analyze the data collection process, resources used, and condition of those assets that lacked previously existing data. Among the findings of the Pilot Report were recommendations specific to the assets included in the report, the methods and tools for data collection, and the quantity of data needed to build capacities for informed decisions.

The purpose of this guide is to assist ODOT employees and outside contractors in gathering traffic barrier inventory information and to maintain a consistent data collection method throughout the state. A commitment to utilize the definitions, processes, and procedures contained in this manual is an important step in moving the agency forward.

The dedication to Asset Management principles by ODOT will foster the development of strategic methods to evaluate asset data and communicate asset needs. This system will prove beneficial throughout the agency in ways such as:

- provide reliable and accurate asset information;
- ensure that public agency activities are consistent with existing federal guidelines, current accounting practices, such as *Governmental Accounting Standards Board (GASB) Statement 34;* and
- helps ODOT as an agency demonstrate to the public that they are responsible stewards of Oregon's transportation assets.

Basic Inventory

Before Inventory Begins

Before collecting inventory, you will first need to do the following:

- Identify the segment of roadway to be inventoried with Team Lead.
- Prepare collection method
    - Digital or physical excel spreadsheet: Use the FACS-STIP Tool Data-To-Go function to export a spreadsheet to the assets to be inspected/collected. Refer to the FACS-STIP User Guide for instructions on how to accomplish this. The FACS-STIP Tools and User Guide are available from the right-hand menu at the following location: *http://transnet.odot.state.or.us/hwy/techserv/ Web%20Pages/FACS-STIP%20Home.aspx*
    - ArcPad on Trimble Handheld Device: Check-out data for assets to be inspected/collected. Refer to "Business System Process: 1R Asset Handheld Application" document for instructions. *file://wpdotfill03/6100pub/1R_Application_Documentation/1R_WOC10_Final_Delivery/7_Business_System_Process_Documentation/Bike-Ped_TrafficBarriers/1R_Business_System_Process_BikePed_TrafficBarrier_v1_0_1.pdf*
- Acquire fundamental working knowledge of the Digital Video Log (DVL).
    - See Appendix B
    - You can access the DVL's User's Guide, at the following website: *http://intranet.odot.state.or.us/cf/dvl/DigitalVideoLog_Instr.htm*
    - The following link provides access to a list of the available video logs: *http://www.oregon.gov/ODOT/TD/TDATA/rics/docs/Videolog_Data_Available.pdf*
- Familiarize yourself with the Field Inventory Manual compiled by Road Inventory & Classification Services (RICS). To do this you will need to contact someone in the RICS unit to request a copy. The RICS website is: *http://www.oregon.gov/ODOT/TD/TDATA/Pages/TDATA_All_Contacts.aspx#Road_Inventory___Classification_Services*
- Familiarize yourself with the terminology (e.g., milepoints, add direction, non-add direction, roadway ID).

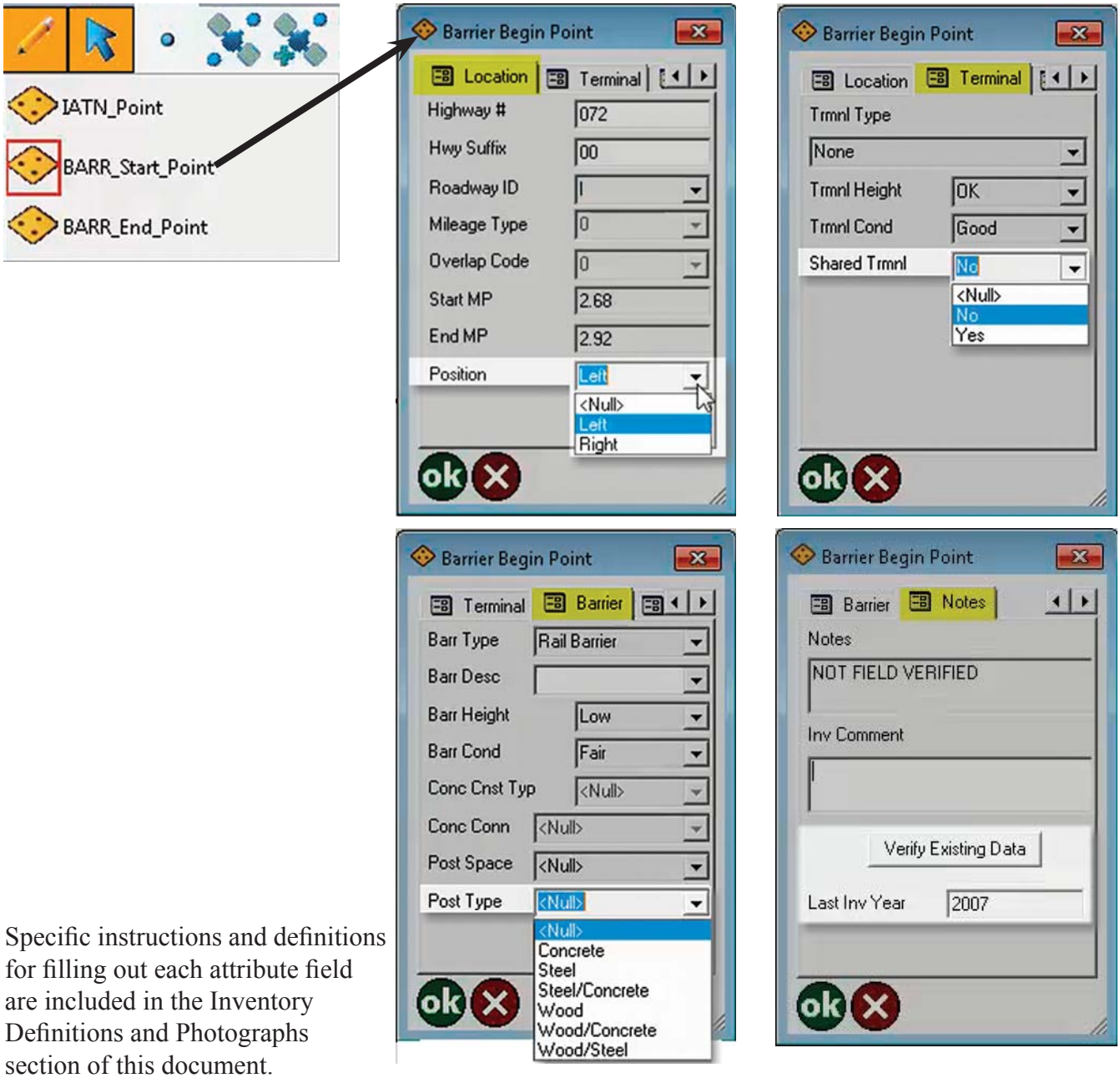
Print a copy, or have access to, the Highway Inventory Summary Report for the relevant segment of highway you are inventorying before you head out into the field (see *Appendix D*). Visit the following website to search for reports according to highway number: *http://highway.odot.state.or.us/cf/highwayreports/aml_summary_parms_by_route_no.cfm*

Data Collection Method

There are two ways to collect traffic barrier asset data:

1. You can use the Data-To-Go Function of the FACS-STIP Tool, available through the ODOT IntRAnet (*http://transnet.odot.state.or.us/hwy/techserv/Web%20Pages/FACS-STIP%20Home.aspx*)
2. You can upload data onto a Trimble GeoXT Handheld GPS Device.

For information on how to upload data using the Trimble, see the Business System Process document for 1R Asset Handheld Applications (*\\wpdotfill03\6100pub\1R_GPS_GIS_Applications\1R_WOC10_Final_Delivery_draft\7_Business_System_Process_Documentation\Bike-Ped_TrafficBarriers\1R_Business_System_Process_BikePed_TrafficBarrier_v1_0_1.pdf*). Below are screenshot examples of what a field inventory specialist would see while collecting data for traffic barriers using the "app" on a GEO-XT. Although there are three different point feature types BARR_Start_Point, BARR_End_Point, IATN_Point (Impact Attenuator Point), they have some of the same fields and typically the same input values.The main difference is that IATN_Point and BARR_End_Point don't exhibit the "Barrier" tab highlighted in the lower left image.



Specific instructions and definitions for filling out each attribute field are included in the Inventory Definitions and Photographs section of this document.

The following is a diagram depicting the attribute fields associated with the three point features collected for traffic barriers.

Traffic Barriers

BARR_Start_Point

Location:

Highway #	Hwy Suffix	Roadway ID	Mileage Type	Overlap Type	Start MP	End MP	Position

Terminal:

Tmnl Type	Tmnl Height	Tmnl Cond	Shared Tmnl

Barrier:

Barr Type	Barr Desc	Barr Height	Barr Cond	Conc Cnst Typ	Conc Conn	Post Space	Post Type

Notes:

Inv Comment	Last Inv year

BARR_End_Point

Location:

Highway #	Hwy Suffix	Roadway ID	Mileage Type	Overlap Type	Start MP	End MP	Position

Terminal:

Tmnl Type	Tmnl Height	Tmnl Cond	Shared Tmnl

Notes:

Inv Comment	Last Inv year

IATN_Point

Location:

Highway #	Hwy Suffix	Roadway ID	Mileage Type	Overlap Type	Start MP	End MP	Position

Terminal:

Tmnl Type	Tmnl Height	Tmnl Cond	Shared Tmnl

Notes:

Inv Comment	Last Inv year

Inventory Definitions & Photographs

Location: This refers to the information that is needed in order to geographically reference where each traffic barrier is located. The goal is to use this information to map the location of traffic barriers along roadways.
When a GPS point location is taken using the mobile GPS unit, the GPS unit should be held directly over the proper traffic barrier terminal.

BARR_Start_Point

Highway #	Hwy Suffix	Roadway ID	Mileage Type	Overlap Type	Start MP	End MP	Position

BARR_End_Point

Highway #	Hwy Suffix	Roadway ID	Mileage Type	Overlap Type	Start MP	End MP	Position

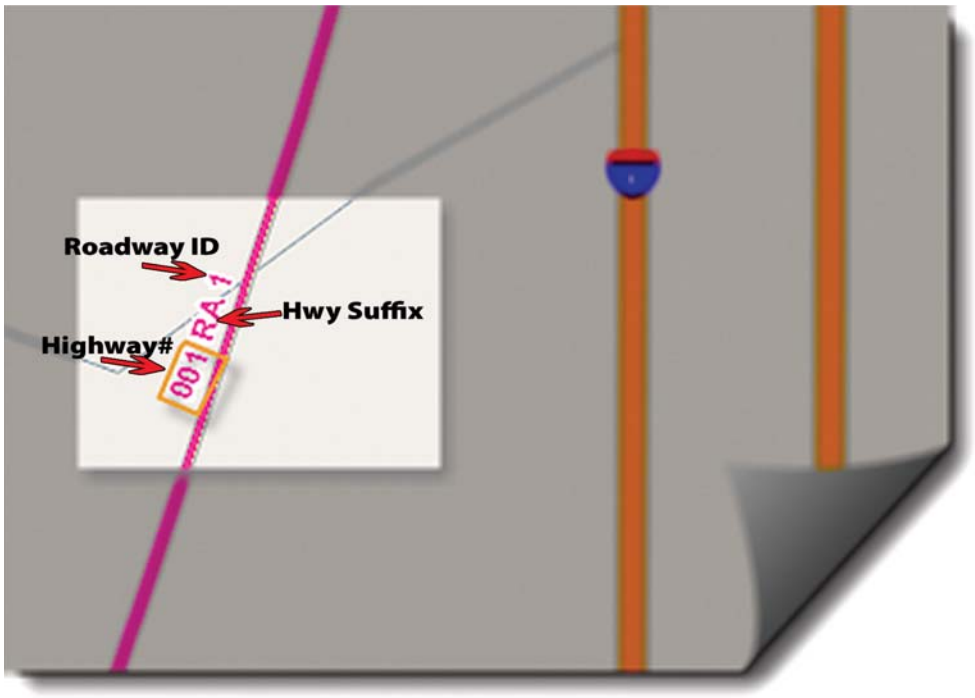
IATN_Point

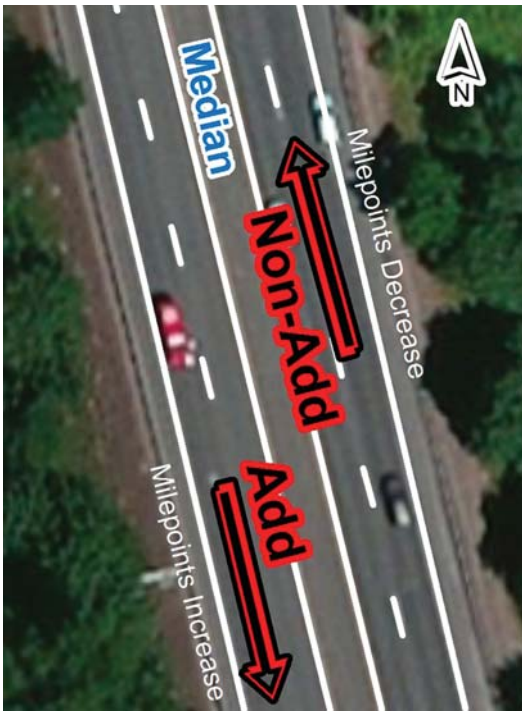
Highway #	Hwy Suffix	Roadway ID	Mileage Type	Overlap Type	Start MP	End MP	Position

Highway # (Highway Number) A three digit state number (not route number) used by ODOT assigned to a length of highway for specific use in the corporate enterprise database. Valid highway numbers range from 001 to 493.

The "Routes | State Highway Cross Reference" report provides a list of Highway Names and their corresponding Route Numbers and Highways Numbers. The list can be viewed at:
http://www.oregon.gov/ODOT/TD/TDATA/otms/Route_Hwy_CrossRef.shtml
This list can also be found in the Appendix E.

Hwy Suffix (Highway Suffix) This is a two digit code that can have a numerical value of 00 or any alphabetical characters ranging from AA - ZZ.





Roadway ID: roadway identifier: field identifies the alignment on which the roadside barrier being inventoried exists. ODOT is currently in the process of switching from one system of Roadway IDs to another. The old system used numbers. The new system uses the letters "I" and "D". Please use the new system when collecting new inventory information. For non-divided highways use Roadway 1 or the letter "I". For divided highways:

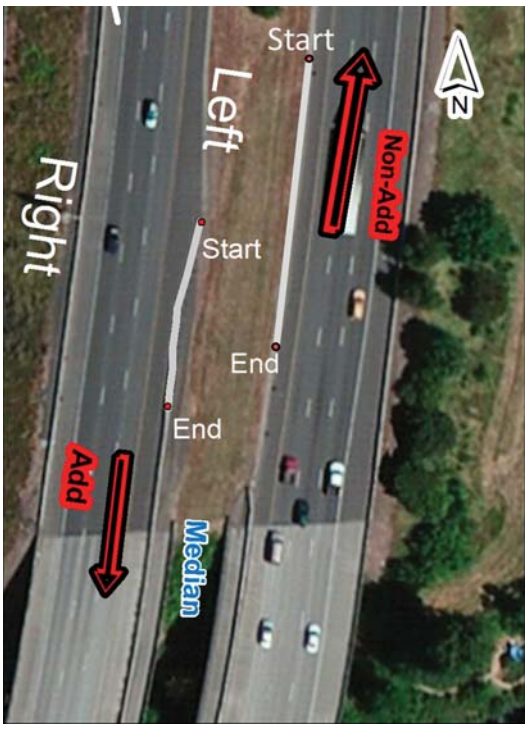
- Add Direction = Roadway 1 = Letter "I"
- Non-Add Direction = Roadway 2 = Letter "D"

I-5 Exception (001): the increasing milepoint was designated as Roadway 2 in the old system and is labeled as "I" in the new system.

Mileage Type: This is used to make milepoints unique in areas where there are multiple occurrences of a milepoint on a single highway. These fields are currently not editable by field inventory specialists. Mileage types are identified as follows:

- Regular mileage is left blank
- Overlaps are indicated with a "Z". Example: Z-mileage refers to a section of road that has been lengthened in the middle due to realignment.

Overlap Mileage: overlapping mileage code: This is used only in conjunction with "Z" mileage. The first chronological occurrence of 'Z' mileage will have an overlapping mileage code of 1, the second occurrence will have a overlapping mileage code of 2, etc. Overlapping mileage occurs when a section of highway is lengthened in the middle due to a realignment. Example: Section of highway from milepoint 49.00 to milepoint 50.00 is washed out. The washed-out section must be replaced, but old alignment cannot be used. A new alignment is built around problem area, but new alignment is 4.62 miles longer than original alignment. New distance between milepoint 49.00 and milepoint 50.00 is now 5.62 miles. To reflect true distance along the highway without renumbering all of the milepoints along the entire road, "overlapping mileage" is created. This field is currently not editable by field inventory specialists using the field data collection application.



Start MP, End MP: starting and ending milepoints: These are two separate fields that represent the distance in miles from the original beginning of the highway. This distance, measured along the contours of the traveled roadway, is derived from construction plans and field inventory. For the purpose of collecting traffic barrier inventory, record the beginning and ending milepoints, to the hundredth decimal place (.01), of each traffic barrier. Milepoints can be determined through use of the DVL in the office or the DMI when in the field. The Begin Milepoint is always the lower milepoint number, and the End Milepoint is always the higher milepoint number.

Position: position of the traffic barrier: Refers to the location along the highway. This is identified as Left (L) or Right (R) based on the "Add" mile direction.

All Highways <u>Except</u> I-5: Add mileage for standard highways occurs in the south and east directions

TERMINALS: These are the very ends of the barriers.

Terminal type. The type categories are as follows: **Terminal**, **Impact attenuator, Transition**, and **Continuation**. When gathering inventory data, you will need to identify the type of terminal located at both the start mile point (BARR_Start_Point) and ending mile point (BARR_End_Point) of the traffic barrier. **Note:** The terminal types are not divided into categories in the Data Collection Application; instead, all types are listed in alphabetical order regardless of category.

BARR_Start_Point

Tmnl Type	Tmnl Height	Tmnl Cond	Shared Tmnl

BARR_End_Point

Tmnl Type	Tmnl Height	Tmnl Cond	Shared Tmnl

IATN_Point

Tmnl Type	Tmnl Height	Tmnl Cond	Shared Tmnl

None - No terminal is present. A barrier terminal that is not a transition, a continuation, or an impact attenuator, but simply the terminus of the.

Other - A terminal other than the listed in Tmnl Type -usually used for Timber Rails or the transition between two different types of Concrete Barriers.

Sloped End Unburied – End slopes down toward the road.

Mound – End is buried in a man-made mound of earth.

Buried in Back Slope – End is buried into the slope of the land (i.e., side of hill).

Blunt A – The terminal has a blunt end that resembles a shovel head. Second post is <u>not</u> breakaway there is no hole drilled in post *(see ET 2000).*

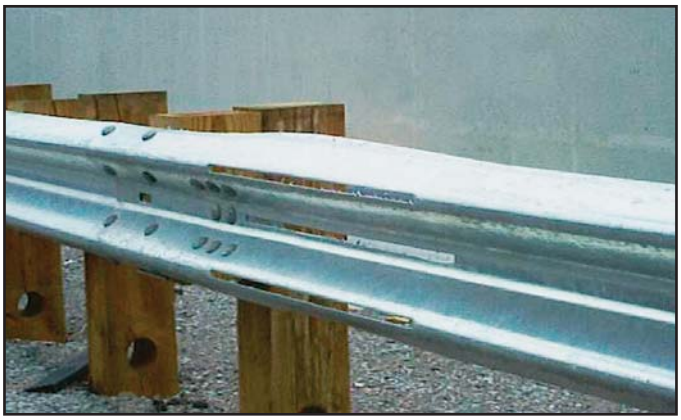
Blunt B – Similar to the Blunt A but the end is a bit more rounded. Second post is <u>not</u> breakaway *(see ET 2000).*

Blunt C – The end piece wraps all the way around to the back of the rail. Second post is not breakaway *(see ET 2000).*

SKT - (Sequential Kinking Terminal) – Characterized by a center horizontal brace and two vertical braces. This terminal is available in two lengths: 37'6" and 50'..

ET 2000 – Has a flat end that is perpendicular to the road. All posts are drilled to breakaway; and there is a ground strut. ***Note***: the ET 2000 has a square end and the ET Plus has a rectangular end.

ET Plus



SRT - (Slotted Rail Terminal) – All posts are drilled to breakaway, and the system has a ground strut. There are pre-formed slots cut in the rail. This terminal is 37.5 feet long. SRTs may have different terminal heads.

Turned-Down-End (**Texas Twist**) – The end is dropped down, and buried into the ground. The end may be rotated (i.e., twisted) or not. ***Note:*** **This Tmnl Type is no longer compliant.**

Breakaway Cable Terminal – Terminal head has various forms. The **first two posts are drilled** to be breakaway *(see ET 2000)*. A **cable** connects the back of the rail with the first post.

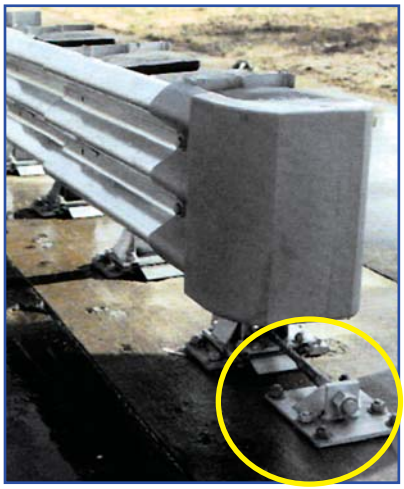
FLEAT - (Flared Energy Absorbing Terminal) – The terminal head has a straight flare, and is 37′ 6″ in length. There is a **tube bracket on top** of the terminal.

Cable Barrier terminal – The cable strands are brought down and anchored to the ground.

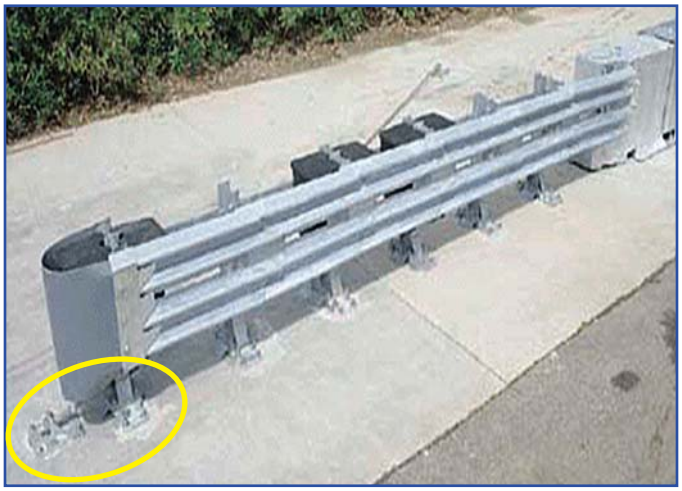
Impact Attenuator – This is a terminal used to shield a point hazard where it is not effective or practical to use a longitudinal barrier or to place a terminal end on a median barrier. The main element for identifying an impact attenuator is to match what you see on the DVL or in the field with one of the pictures below. An impact attenuator can be attached to a traffic barrier (i.e., a Rail, Cable Barrier, or Concrete Barrier), or it can stand alone.

If the impact attenuator is attached to a traffic barrier follow the same guidelines used for all other terminals when recording inventory data.

If the impact attenuator is an independent feature (i.e. connected to a structure), it is to be treated as a point feature rather than a line segment. To record this, BARR_Start_Point, BARR_End_Point, and IATN_Point must all have the same recorded location.



IA-Sentre – The system contains a **cable and anchor,** thrie rail side panels, and sand-filled boxes set into the middle. Can be installed as a straight (parallel to roadway) or flared (angled) unit.



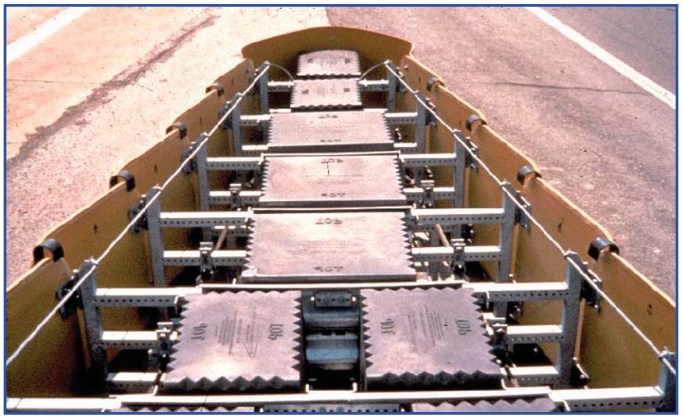
IA-QuadTrend – The system is very similar to the Sentre in that it contains a **cable and anchor,** and sand-filled boxes set into the middle. The distinguishing characteristic is the quad-rail side panels with slots.

IA-QuadGuard (Narrow or Wide) – The side panels are made of quad rail and the modules inside are similar to those used in the GREAT and Hex-Foam Sandwich.

IA-QuadGuard Elite – Similar to the QuadGuard, except, the system has cylinders made of high density polyethylene plastic.

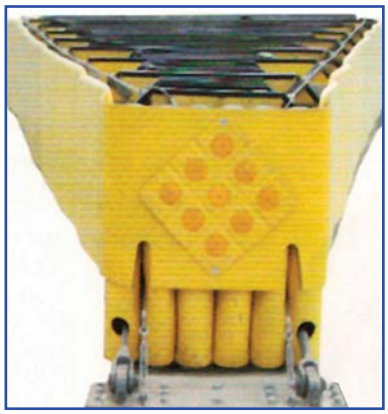
IA-TRACC - (Trinity attenuating Crash Cushion) – Similar to the QuadGuard in that the side panels are made of quad rail; but, unlike the QuadGuard, there are no modules.

IA-SCI 100 GM – Characterized by 4 evenly spaced ridges along the sides. There are no modules inside, but there is a cable located at the bottom of the attenuator.



IA-Hex-Foam Sandwich – The attenuator has crushable modules in the center. There are deflective panels on the sides that telescope upon impact.

IA-GREAT - (Guard Rail Energy Absorbing Terminal) – The sides telescope and are made of thrie rail. The modules inside are similar to the type used in Hex-Foam & QuadGuard.



IA-Hi-Dro Sandwich – Contains rubber tubes filled with water to absorb the crash.

IA-Sand Barrels – Consists of multiple barrels filled with sand organized in front of a hazard.

IA-REACT – Polyethylene tubes (barrels) that flatten out in a hit and then open back up. ***Note:*** Need to identify the number of barrels in the "Comments" field

IA-CAT 350 – (Crash Cushion Attenuating terminal) – Posts are drilled for easy breakaway. There are perforations in the rail, and it has a ground strut.

IA-Brakemaster – This attenuator telescopes when hit and is characterized by the braking mechanism located in the head of the barrier.

IA-QUEST – Characterized by two round steel pipes angled down at the front of the unit. There is also a round tube set longitudinally along the bottom.

IA-TAU II – Has three ridges and round energy absorbing cartridges placed inside. Narrow IA-TAU II is on the left and Wide IA-TAU II in the right photo.

Transition – Refers to the connection between two traffic barriers, or a traffic barrier and another structure (e.g., bridge rail). Note: When one transition connects two traffic barriers it is labeled as the end of one, and the beginning of the other.

Tran-Pre 230 – Attached with w-rail (2 crests, 1 trough). It is the only transition without thrie rail. See "Rail Type" under guardrails for a close-up picture of w-rail/w-beam.

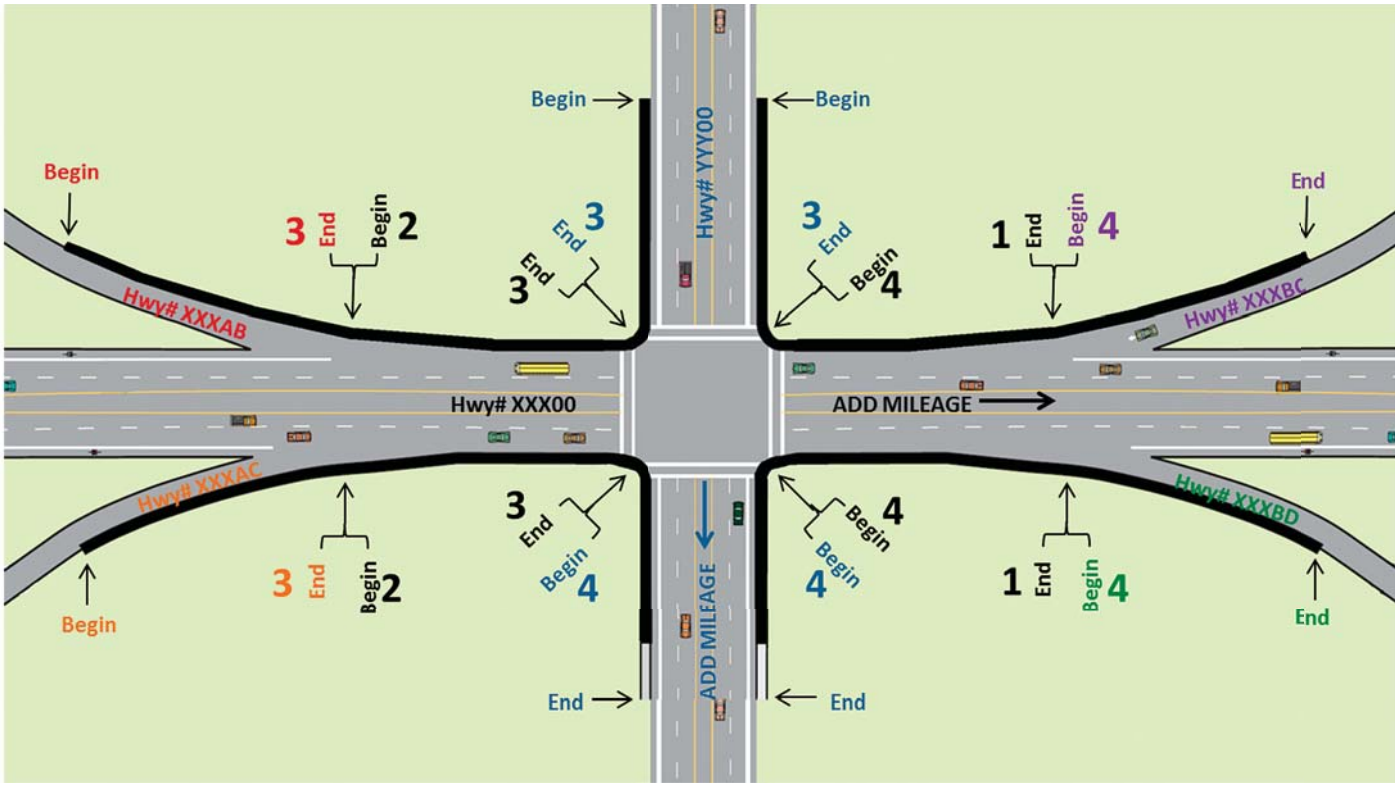
Tran-230 – Attached with thrie rail (3 crests, 2 troughs) and post spacing of 3′ 1½″. *See "Rail Type" under guardrail for a close-up picture of thrie rail.*

Tran-350 – Attached with thrie rail *(see transition 230)* and post spacing of 18.75″ (1′ 6¾″).

Connected to Structure – Refers to a concrete barrier that connects directly to a structure (e.g., a bridge rail).

Tran-CB/GR – The cable is connected through the guardrail and anchored to the back.

<u>Continuation</u> – Refers to a traffic barrier with a beginning and/or ending milepoint on a side road or ramp. An explanation for how to properly collect inventory data for continuations is provided after the definition of each type of continuation listed below.



1. **Continues to Ramp –** Only valid for Barrier End Point terminal type - Traffic barrier begins on a mainline and ends on a ramp.
2. **Continues from Ramp –** Only valid for Barrier Start Point terminal type - Traffic barrier begins on a ramp and ends on a mainline.
3. **Continues to Other Roadway –** Only valid for Barrier End Point terminal type - A traffic barrier that begins on a mainline and ends on a side road or off ramp. ***Note:*** Write down the name or highway number of the road the barrier continues to in the "Comments" box.
4. **Continues from Other Roadway –** Only valid for Barrier Start Point terminal type - A traffic barrier that begins on a side road or on ramp and ends on a mainline. ***Note:*** Record the name or highway number of the road the barrier continues from in the "Comments" box.

Tmnl Height: Terminal Height: Refers to the distance measured from the road surface to the top of the terminal. This will not be a precise measurement; instead, it will be given a classification of **Low**, **OK** or **High**. The height assessment is made with relation to the standard height of the terminals. The initial height assessment should be made with your best judgment while using the DVL, then field verified. ***Note:*** Sometimes there are objects on the screen that can provide a good reference for measurements.

High – The terminal has been incorrectly installed and is higher than the standard (higher than 32.5 inches), or when it visually stands out as appearing high in height. There should not be many terminals fitting the "high" category.

OK – The terminal has been properly installed according to the standards, and it meets the height requirements. Typically impact attenuators that meet the "OK" classification are between 28.5 inches and 32.5 inches.

Low – A terminal should be classified as low when it is noticeably lower than the standard height (lower than 28.5 inches), or when it visually stands out as appearing short.

Unknown

Tmnl Condition: Terminal Condition: This refers to an assessment of the overall appearance of the terminal. The initial condition assessment should be made when using the DVL, and then verified when in the field.

Good – Appears to have been correctly installed, and there are no visible indications of impact.

Fair – Appears to have been correctly installed, but there are signs of impact which have not rendered the terminal ineffective (e.g., dents, misshapen end, misshapen rail).

Poor – Obvious signs of incorrect installation, or impact that has rendered the barrier non-functional (e.g., broken terminal end, missing or broken posts).

Unknown

Shared Terminal: This refers to a terminal that is used for two traffic barriers, such as a terminal that is used for both the barrier on the left edge of a right side exit lane and the right side of the mainline. Also refers to a transition terminal.

- When a terminal is used by two traffic barriers, both should say YES
- When a traffic barrier ends/starts at a bridge rail, shared terminal is NO
- When a terminal is a "Continue" type, Shared Terminal is NO
- When a Transition Terminal is used to connect two traffic barriers, Shared Terminal is YES.

Barrier

BARR_Start_Point

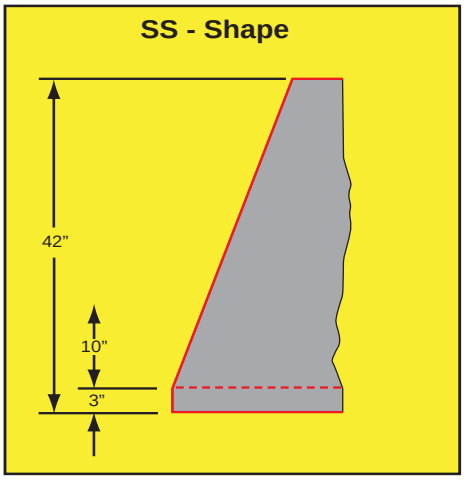
Barr Type	Barr Desc	Barr Height	Barr Cond	Conc Cnst Typ	Conc Cnst	Post Space	Post Type

Barr Type: Barrier Type: Portion of barrier located between the beginnings and ending terminals; refers to the horizontal portion of the barrier. Requires one of the following:

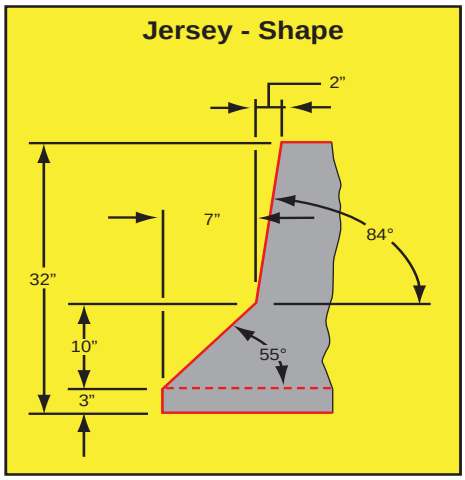
Cable Barrier
Concrete Barrier
Rail Barrier

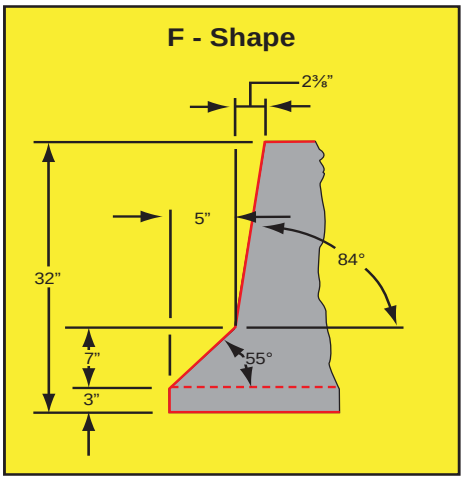
Barr Desc: Barrier Description: Refers to portion of barrier located between the beginning and ending terminals, and is dependent on barrier type. A barrier description of "Other" means there are currently no records in the database

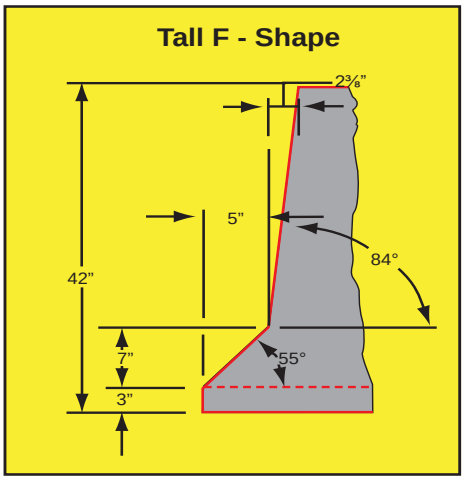
When barrier type is **Concrete Barrier,** the description requires one of the following:
Jersey
F
SS (Single Slope)
Tall_F



When barrier type is **Cable Barrier**, the description requires one of the following:
3-STRAND
4-STRAND
OTHER







When barrier type is **Rail Barrier**, the description requires a combination of shape, material, and/or finish type of the horizontal rail displayed below:

FLYING W
HALF MOON
MOD THRIE
TIMBER
SBT (Steel Backed Timber)
THRIE
TWO RAIL SBT (Steel Backed Timber)
CORTEN
GALV
GALV/THRIE
GALV/CORTEN
GALV/PAINT
PAINT
PAINT/CORTEN
GALV W/RUBRAIL
OTHER

Note: A W-Beam rail is Characterized by having two distinct waves (2 crests, 1 trough).

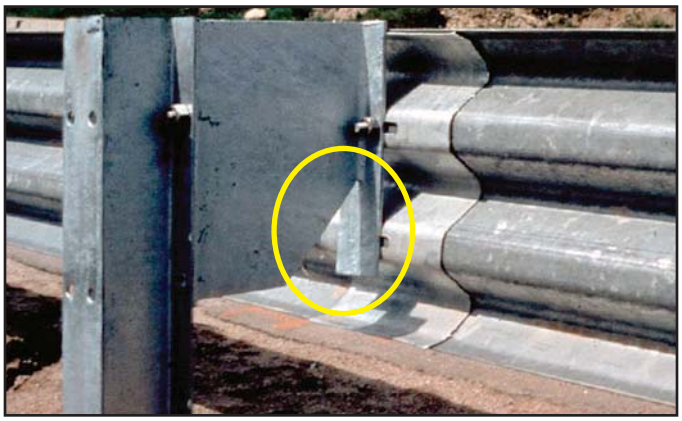
GALV– A w-beam that has been coated with rust-resistant zinc.

CORTEN (Rusty Rail) – This refers to the use of weatherized steel, which has a "weathered" or "natural" appearance.

PAINT – A w-beam with a paint finish.

GALV W/RUBRAIL – As shown in the picture, this system has a w-beam with the addition of a rail along the bottom (rub rail). The purpose of this rub rail is to prevent vehicle tires from snagging on the posts in the event of a crash.

THRIE – Characterized by having three distinct waves (3 crests, 2 troughs).



MOD THRIE – Characterized by the notch in the block-out.

FLYING W – Characterized by a “wing” on each side of the guardrail; hence the name.

SBT – **(Steel Backed Timber) -** Rectangular prism shaped timber with steel backing.

TWO RAIL SBT

TIMBER – The rail is made of round timber and has steel backing.

HALF MOON – The rail is shaped like a half-circle. It does not have the typical ridges other guardrails do.

Barr Height: traffic barrier height – Refers to the distance measured from the road surface to the top of the traffic barrier. This will not be a precise measurement. Assessing the height is done with regard to ODOT standards. The standard height for a w-beam rail is 28.5″, and the standard height for a thrie rail is 32.5″. The initial height assessment should be made with your best judgment using the DVL and then field verified. ***Note:*** Sometimes there are objects on the screen that can provide a good reference for measurement.

High – Incorrectly installed, higher than standard (higher than 32.5 inches), or when it stands out as visually appearing high in height. Note: There should not be many rail type barriers in this category.

OK – Properly installed, meets height requirements (between 28.5 and 32.5 inches)

Low – Lower than standard height (lower than 28.5 inches) or visually stands out as appearing short in height, and/or, road surface covers more than the bottom "reveal" segment (i.e. 3") on a Jersey, F, Tall_F concrete traffic barriers, and/or, SS concrete traffic barrier is less than 42" tall.

Unknown

Barr Cond: Traffic Barrier Condition: overall appearance

Good – Correctly installed, no visual indications of impact, no rust

Fair – Correctly installed, signs of impact which has not rendered the traffic barrier ineffective, and/or some rust. e.g., bent posts, misshapen rail /cable, barrier connection that appears to be out of alignment.

Poor – Incorrect installation, impact rendered barrier non-functional, and/or significant rust. e.g., missing or broken posts, terminals, rails, or concrete barriers cable stand, cracks or breaks in the concrete barrier

Unknown

Conc Cnst Typ: Concrete Construction Type: type of method used to construct concrete barriers and place them in a location. This field is only applicable to Concrete Type Barriers.

Cast in Place – The barrier is formed on site, and has contraction joints every 15 feet and expansion joints every 90 feet. The picture above is of a Single Slope, Cast in Place concrete barrier.

Precast – The barrier is formed off site and transferred to location in 10 foot sections. A precast concrete barrier will have one of the connections listed in the following section.

Conc Conn: Concrete Connection: identifies the type of connection used to hold the precast sections of concrete barriers together. This does not apply to cast in place concrete barriers.

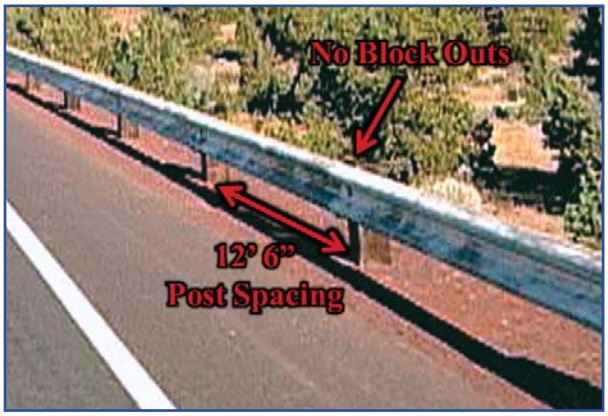
4 or 6 Pin and Loop– Used on Jersey and F concrete traffic barriers. Sections are held together by a pin that is placed between 4 or 6 loops. The loops can be made of cable or rebar.

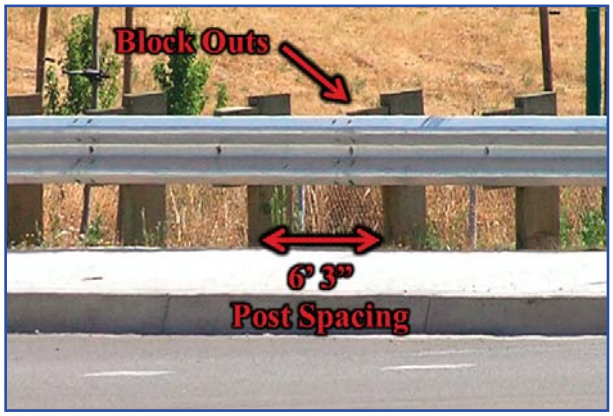
C- Channel Connection – Used only on the Tall F-Shape and Single Slope barriers. It is characterized by four opposing "C" channels locked together by a 1" diameter bolt.

Tongue and Groove – Sections fit together with a lengthwise *tongue* which extends out on one side and fits into a channel or *groove* on the opposite side.

Post Space: Post Spacing: measurement in ft. and in. of the space between the posts that anchor the barrier and whether or not, block-outs exist

Type 1	12'6" spacing, no block-outs
Type 1A	12'6" spacing, with block-outs
Type 2	6'3" spacing, no block-outs
Type 2A	6'3" spacing, with block-outs

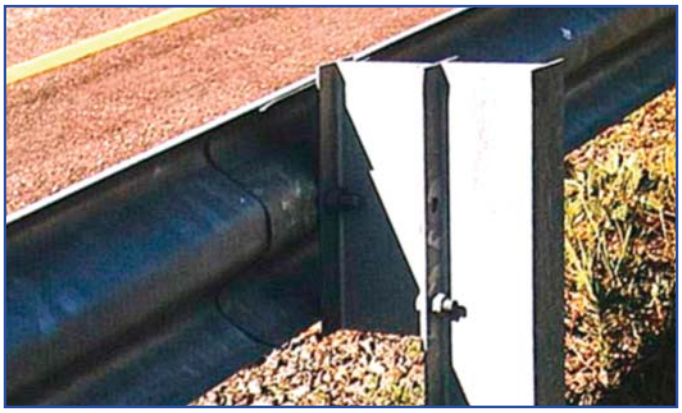




Post Type: the post and block-out material of Rail type barriers.

Posts can be Wood, Steel, Concrete, or a combination of two of these materials. Note: this does not refer to the material of the block-out, only the material of the post. If block-outs exist, please note the material type of the block-out in the Notes field.

Concrete Posts with no block-outs.



Steel Posts with steel block-outs.

Wood Posts with wood block-outs

Steel Posts with plastic block-outs

Procedures For Storing, Uploading, & Accessing Road Inventory Information

Storing Inventory Data

While collecting road inventory data, the information will be stored in the same excel spreadsheets used for collection purposes.

Uploading Data into Database

Data collected by the Trimble Handheld device will be uploaded into the system by the processes described in the Business System Process document for 1R Asset Handheld Applications. Data collected by spreadsheet should be uploaded to the FACS-STIP tool as a comment under the 1R heading. This upload will start the process of notifying the data owner for that asset, and they will add the information to the asset database. For specific instructions of how to upload comments in FACS-STIP, see the current FACS-STIP Tool User Guide located in the right hand menu here:
http://transnet.odot.state.or.us/hwy/techserv/Web%20Pages/FACS-STIP%20Home.aspx.

Accessing Data

Asset data can be accessed and downloaded from the FACS-STIP tool available on the intranet. For information on how to view and export data using the FACS-STIP Data To Go Tool, see the current FACS-STIP Tool User Guide located in the right hand menu here:
http://transnet.odot.state.or.us/hwy/techserv/Web%20Pages/FACS-STIP%20Home.aspx.

Frequently Asked Questions

1. **Why do we need to inventory traffic barriers?**

   As ODOT moves toward an asset management approach, it is important that we have an accurate record of the existing transportation infrastructure. ODOT needs to know what type, and how many traffic barriers are present on the highways. This information will help ODOT maintain and upgrade assets in a cost-effective way. In addition, maintaining a record of current inventory data is also important for funding purposes.

2. **What is the difference between an "ODOT Highway Number" and the highway "Route Number"?**

   An ODOT highway number is a three-digit ODOT number that is assigned to a length of highway. This number is used by ODOT transportation staff as a referencing system to identify a particular road for inventory or research purposes. A route number is assigned to a particular route (e.g., interstate route, US route, OR route) and is used to follow a particular path through a road network. This route number is mainly used by drivers for traveling purposes.

3. **What is the Highway Inventory Summary Report?**

   This is a report detailing the milepoint locations of roadway features. This report is run by accessing TransViewer online; which is continually updated by ODOT's Road Inventory and Classification Services (RICS) Unit

4. **How do I determine milepoint information for a ramp?**

   By using the Highway Inventory Summary to run a report for the section of roadway you are inventorying. Below is sample of the relevant columns to look at in the Highway Inventory Summary Report, and an example of how you use it to determine the ramp milepoint for the place where a ramp leaves a mainline. The mainline milepoint number is highlighted in blue and the ramp milepoint number is highlighted in yellow.

Roadway	Mileage Type	Overlap Code	Mile Point	Dup	Roadway Codes					Description
1			307.76		S	=	|			001VT CONN. M.P. 5C307.76

5. **What should I do when there are multiple traffic barriers in one location?**

   Inventory all the barriers present. If necessary use the comment field to add any additional information, such as overlapping barriers, etc.

6. **What is the best way to estimate the size of traffic barriers from the video log? (Any other estimates that might be necessary?)**

   Sometimes there are other objects in the picture which may provide a height reference, otherwise, just use your best judgment. If you are really unsure about a particular traffic barrier – or portion of one - be sure to mark "Field verify height" in the "Comments" field so you know to check the height when out in the field. Your ability to estimate height using the DVL will improve with time.

7. **How accurate does the milepoint data need to be?**

   Use the milepoint number shown on the DVL screen. The number should be identified to the second decimal place (e.g., 7.35).

8. **How should I inventory traffic barriers on sections of highway that have multiple highways that cover the same section of road?**

   To avoid having more than one data set with the same traffic barrier inventory information, inventory should be collected and recorded for the highway with the lowest ODOT highway number only.

9. **Are there traffic barriers that we do <u>not</u> inventory?**

   Yes. We do <u>not</u> inventory traffic barriers that are part of other structures, such as bridges (e.g., bridge rails). If you're not sure if a barrier is part of another structure, collect the inventory information, make a note in the "comments" field and make a note for yourself to check with a supervisor.

10. **What if I see something in the field that I do not know how to identify in my inventory?**

    Take a picture of the object, take note of the condition and milepoints, and ask a supervisor, or someone listed under "Contacts & Resources" for assistance.

Contacts & Other Useful Resources

Steven Lindland, P.E.
Roadway Engineering Manager
Technical Services Branch
4040 Fairview Industrial Dr SE
Salem, OR 97302-1142
(503) 986-3557
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Laura Wipper
Performance Management Consultant
Audit Services Division
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Salem, OR 97302-1142
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Heather King
Road Inventory & Classification Services
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(503) 986-4157
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Lily Nguyen
Operation & Design Manual Engineer
Engineering Services
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Lily.N.Nguyen@odot.state.or.us

Laura Hansen
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Asset Management Integration Section
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Salem, OR 97302-1142
(503) 986-3308
Laura.L.Hansen@odot.state.or.us

Tyler Ferguson
Asset Management Specialist
Roadway Engineering
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Salem, OR 97302-1142
(503)986-3524
Tyler.J.Ferguson@odot.state.or.us

Websites:

- ODOT, Roadway Engineering:
  http://www.oregon.gov/ODOT/HWY/ENGSERVICES/pages/index.aspx
- Transportation Development Division
  ODOT intranet link: *http://intranet.odot.state.or.us/tdb/index.htm*
  ODOT internet link: *http://www.oregon.gov/ODOT/td/Pages/index.aspx*
- Road Inventory and Classification Services Unit: website at:
  http://www.oregon.gov/ODOT/TD/TDATA/TDATA_All_Contacts.shtml#Road_Inventory___Classification_Services
- Federal Highway Administration (FHWA):
  http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/
- ODOT Travel Guide is useful for planning trips:
  http://www.tripcheck.com/
- ODOT intranet link:
  http://transnet.odot.state.or.us/odot/home/default.aspx

Appendix A

Commonly Used Terms

Longitudinal Barrier – A barrier designed to prevent penetration and safely redirect an errant vehicle away from a traffic or median hazard.

Median Barrier – A traffic barrier designed to protect against median crossover head-on crashes.

Module – An independent unit set inside an impact attenuator that can be easily rearranged, replaced or interchanged as needed.

Strut – A rigid structural member used as a support.

Telescope – Refers to the contracting motion that takes place when the sections of an impact attenuator slide neatly, one inside another, like the sections of a telescope.

Appendix B

How To Use The Digital Video Log

Note: Press "ctrl" and click on titles above to instantly scroll to desired section.

Background

The Digital Video Log (DVL) is a pictorial record of state highway system from a driver's perspective. The DVL consists of digital images taken every five thousandth of a mile. The DVL proceeds from mile point zero to the end of the highway. You can reverse the direction (end of highway to mile point zero) with the Increasing Mile Points and Decreasing Mile Points radio buttons. By using these two radio buttons you can view the highway in both directions of travel.

Most of the highways were driven in the right lane with a single camera mounted in the center of the vehicle. The shoulders and side conditions of the road are visible, though the perspective may be skewed a bit. Most people find they can get information about road conditions, shoulder width, etc. from the DVL.

For more detailed instructions, go to the "How to Use the Oregon Department of Transportation Digital Video Log (DVL)" instruction sheet located here:

http://rssa.odot.state.or.us/cf/dvl/DigitalVideoLog_Instr.htm

How to Use the Digital Video Log

1. From the DVL home page: (http://rssa.odot.state.or.us/cf/dvl/index.cfm)
   Click on "Click Here to Begin" to activate the Digital Video Log.

2. Choose from the following options on the next screen. Keep in mind that the default settings are the most commonly used. Most people will only need to adjust the Highway Number, Season, and Starting Milepoint to view the images they need.

   1. *Highway* – The highways are listed by the official ODOT highway number (not the route number found on maps). Choose any available highway from the drop down menu.

      To find the official ODOT Highway Number Use the State Highway Cross Reference:

      - *http://www.oregon.gov/ODOT/TD/TDATA/otms/Route_Hwy_CrossRef.shtml*
      - See Appendix F

      The list of available highways is based on the criteria selected in the fields 2, 3 and 4. For example, if you uncheck Highways and check Frontage Roads in the Road Type Field, the highway list will only contain Frontage Roads.

   2. *Road Type* – Accept the default – Highways.

   3. *Mileage Type* – This is an internal code and is of no use or concern to the lay user. Accept the defaults.

4. *Season* – The Digital Video Log will automatically default to the most current images for your chosen highway, and will list other available years in the Season pull down list. You can view images from previous seasons by choosing a different year from the Season pull down list. DVL seasons run from May 1 – April 30 each year. Approximately one half of the state highway system is taped annually.

5. *Starting Milepoint* – This will default to the beginning milepoint for the chosen highway and year, but you may choose a different starting milepoint from the pull down list, or enter a milepoint in the entry field. East-West roads "begin" (mile point zero) in the West. North-South roads "begin" in the North. I-5 is an exception. It "begins" at the California border.

6. *Direction* – The DVL is taped in both traffic directions, so images may be viewed in either Increasing or Decreasing Milepoint direction. The increasing milepoint is the default direction. The DVL proceeds from mile point zero to the end of the highway. You can reverse the direction (end of highway to mile point zero) with the Increasing Mile Points and Decreasing Mile Points radio buttons. By using these two radio buttons you can view the highway in both directions of travel.

3. Choose one of the following to start viewing images:

   Display Image button – This will display the images on the same screen as the milepoint DVL for the highway, and will allow the user to scroll through images one at a time. (See below for further information about how to use this feature.)

   Play Images button – Allows you to play the images of your selected highway consecutively. (See below for further information about how to use this feature.) Reset – Resets all fields on the page back to the default settings.

How to Use Display Image

Once the video image is displayed, you can move through the images one at a time by clicking the <<< (Previous Image) or >>> (Next Image) buttons below the image. The size of the image can be increased by clicking on the image.

Select New Highway – Goes back to highway selection screen where you can choose a different highway or change options for the same highway (such as choose a different year).

Increment (Inc Amt): The images will change by increments of 0.05 mile by default, but you can change the Increment Amount. For example, entering 10 in the increment box will change the frame by 0.10 mile and 100 will change the frame by 1.00 mile.

Increasing/Decreasing (Incr / Decr): You can choose to view the highway in either increasing (Eastbound or Southbound, except I-5) or decreasing direction Westbound or Northbound, except I-5) by clicking the appropriate direction button.

<<< – Moves to the previous image by increment amount

>>> – Moves to the next image by increment amount

Play Images – Goes to the Play Image tool where the images are played automatically. See "How to Use Play Images" section below for instructions on this tool.

Home – Returns to the DVL home page

Milepoint Log – The milepoint log that corresponds to the year of the images is displayed at the bottom of the screen. You can scroll through the log to look for a particular feature, like a City's name or a side street. You can jump directly to the image of a specific milepoint by clicking

the shaded milepoint button in the milepoint log below the image. See below for more detailed instructions for reading the milepoint log.

How to Use Play Images

Use this feature to play images of the selected highway consecutively. This works much like a VCR, with play, pause and rewind.

Increment: The images will change by increments of 0.015 mile by default, but you can change the Increment Amount. For example, entering 10 in the increment box will change the frame by 0.10 mile and 100 will change the frame by 1.00 mile. To change the increment amount, select a new increment from the pull down list.

Select New Highway – Goes back to highway selection screen where you can choose a different highway or change options for the same highway (such as choose a different year).

||<<< – Jumps to the beginning of the highway. You will need to select Play or Rewind after clicking on this choice.

|<<< – Jumps to the start of the currently selected images (+/- 2 miles of the requested milepoint). You will need to select Play or Rewind after clicking on this choice.

Rewind – Plays images backwards

Pause – Pause playing of images

Play – Plays images forward

>>> – Jumps to the end of the currently selected images (+/- 2 miles of the requested milepoint). You will need to select Play or Rewind after clicking on this choice.

>>>| – Reposition to the end of the highway. You will need to select Play or Rewind after clicking on this choice.

Display Image – Goes to the Display Image page

Home – Goes to the DVL home page

Increase / Decrease MP – Click on selection – then click on Play or Rewind

Starting MP – Click on selection – then click on Play or Rewind

Increment – Changes increment between each image.

Play Speed – The default play speed is 1 image every 3.5 second. You can choose between .25 – 5 seconds / image.

Milepoint Log – Clicking on the Milepoint Log button will open up a new window with a corresponding milepoint log. You can scroll through the log to look for a particular feature, and jump directly to the image of a specific milepoint by clicking the shaded milepoint button in the milepoint log. After clicking on a milepoint, minimize the milepoint log window to uncover the Play Images screen.

Reading the Milepoint Log:

Roadside features on the state highway system change regularly. With this in mind, the DVL displays the milepoint log that matches the year the pictures were taken.

The Milepoint log displays the following information for each milepoint:

Rdwy ID (Roadway ID) – This number identifies the alignment on which this milepoint exists. Rdwy ID 1 is the increasing mileage direction for traffic and Rdwy ID 2, the decreasing mileage traffic direction. The exception being Hwy. 001 (I-5), on which Rdwy 1 (southbound) is the decreasing mileage direction. *Don't even pay attention to this feature. It's an internal coding system of no consequence to the lay user.*

Mlge Type (Mileage Type) – Z = overlapping, Y = Spur, T = Temporary *Don't even pay attention to this feature. It's an internal coding system of no consequence to the lay user.*

Ovlap Cd (Overlap Code) – Used with 'Z' mileage only. The milepoint overlapping code indicates the sequential order in which 'Z' mileage was added to a highway. Don't even pay attention to this feature. It's an internal coding system of no consequence to the lay user.

Milepoint – A number that represents the distance in miles from the original beginning of the highway. This distance, measured along the contours of the traveled roadway, is derived from construction plans and field inventory.

Dup (Duplicate) – A number of 10, 20, etc. in this column indicates multiple features at the same milepoint and engineering station.

Roadway Codes – These codes indicate the direction (left or right) and jurisdiction of intersecting roads, culverts, structures, boundaries, etc. (The codes have been omitted from these instructions for brevity.)

Update Cycles

Approximately one half of the state highway system is taped annually, with emphasis on Interstate and US Routes. The annual Video Log seasons run from May 1 to April 30.

The highway milepoint log report is a snapshot of data from TransInfo. A yearly snapshot is taken at the beginning of the taping season in May.

Printing

- To print the whole page as seen on your computer screen including the menu, image and beginning of the milepoint log on one page – change to landscape mode under File/Print/Preferences, and click OK. Then choose "As laid out on screen" under Print/Options/Print Frames/OK
- To print just the menu, the image or the milepoint log alone – first click in the section you want, then click File/Print/"Only the selected frame" under Options/Print Frames/Print.
- To print everything, but each on a different page – click on File/Print/"All frames individually" under Options/Print Frames/OK.
- To print only a selected portion of the milepoint log – Highlight the section of the milepoint log wanted, click on File/Print/Change from "All" to "Selection" under Print Range/OK.

Saving an Image

- Right click on the image.
- Click on "Save Picture as"
- Go to the drive/folder you want the image saved in
- Name the file
- Choose to save it as a .jpg file

- Click save

To view the .jpg file, either double click on the file name, or open the file from within Microsoft Photo Editor.

DVL Frequently Asked Questions (FAQ's)

1. **Why is there an occasional lag while I am viewing a highway?**

   The DVL automatically goes out and collects images + or - 2 miles on either side of your selected milepoint. This is done to enable faster loading speeds for viewing. Once you reach the outside range of the requested milepoint, the DVL will go out and collect the next set of images. This will result in a short pause while the needed images are stored.

2. **Why do I get the error "Auto Play has been exceeded"?**

   This message may appear while in play mode. The purpose is to stop continuous playing of a highway by accidentally leaving the DVL playing, which can slow down the server for others. If someone begins playing a highway and the DVL reloads the +/- 2 mile images 21 times then this error message will appear.

3. **Where did my buttons go on the display image screen?**

   Sometimes when the display image screen is in a minimized window the buttons will be below the viewable area in order to allow room to show the image. Simply drag the lower silver dividing bar directly under the image down and your buttons will appear.

4. **While in 2006 season can I open both images in separate windows?**

   Yes you can. Simply click on each image to enlarge and they will open in their own windows. The enlarged images will automatically update to reflect the selected milepoint on the main screen.

5. **Is there a web address where customers can access the DVL via the internet?**

   Yes there is. Direct them to *https://zigzag.odot.state.or.us/uniquesig019ee525c2417660010f455a2e7b493f99328119c098c695358162b70c69eaec/uniquesig0/cf/dvl/*

6. **Why do I sometimes see a red X?**

   This is due to a missing image. Due to the large amount of images collected occasionally one is not collected or is corrupted.

7. **Why can't the images be larger on my screen while viewing the milepoint log?**

   Users of the DVL have various needs for display. The application was developed to be viewed in many different resolutions and screens.

8. **Can I use the milepoints displayed on the video log for measuring?**

   Depending on your needs, the Video Log may be used to obtain or verify milepoints. Please keep in mind that the accuracy of the Video Log is +/- .02 miles. In addition, since not all highways are taped each year, there may have been construction work since the last Video Log that could have an effect on the milepoints. The most accurate and up to date milepoints can be obtained through the TransViewer reports located at *http://www.oregon.gov/ODOT/TD/TDATA/pages/otms/OTMS_Highway_Reports.aspx*

9. **Why doesn't the milepoint log reflect a new construction project?**

   The milepoint log is a snapshot of data each May 1. Due to the timing of the milepoint log snapshot, the collection of the images and the entry of the construction plans, not all projects will be represented in the DVL.

10. **Why is the route on the DVL different than I would expect?**

    There is not enough room on the images to list all of the routes so a hierarchy is followed: Interstates, US and then Oregon. When there is more than one kind (such as two Oregon Routes) then the lowest route number is used. There are a few exceptions to this rule where the State Highway Engineer has designated which route will be shown such as US97 in Bend instead of US20.

11. **Why doesn't the DVL always show two images?**

    The addition of a second camera did not occur until the 2006 season. Images collected prior to 2006 utilized the single camera system.

12. **I can't see the milepoints on the JPEGS while in "Play Images" mode.**

    This situation can occur if your monitor resolution is too low. In addition to not being able to view the milepoints, the buttons on the bottom of the page may also disappear. To remedy both of these situations check to make sure your monitor resolution is set to 1024 x 762, or above.

13. **How can I get only one image to display?**

    This functionality has been included for those who only want to view a single image on their screen while in "Play Images" mode. You simply uncheck "Display Image" for whichever camera you would like to disappear. Recheck the box and the camera will reappear. While in "Display Images" mode, click on the image you want to display. When the new window opens, the same options for advancing images are available as in the dual image window.

Appendix C

State District & Region Maps

A variety of maps are available, in both electronic and hard copy version:

City Maps
County Maps
Statewide Maps
ODOT Region Maps
ODOT District Maps
Pavement Condition Maps
Seismic Lifeline Maps
SPIS Maps (2013)
Microstation Map Files

To access, go to the following website: *http://www.oregon.gov/ODOT/TD/TDATA/Pages/gis/odotmaps.aspx*

Appendix D

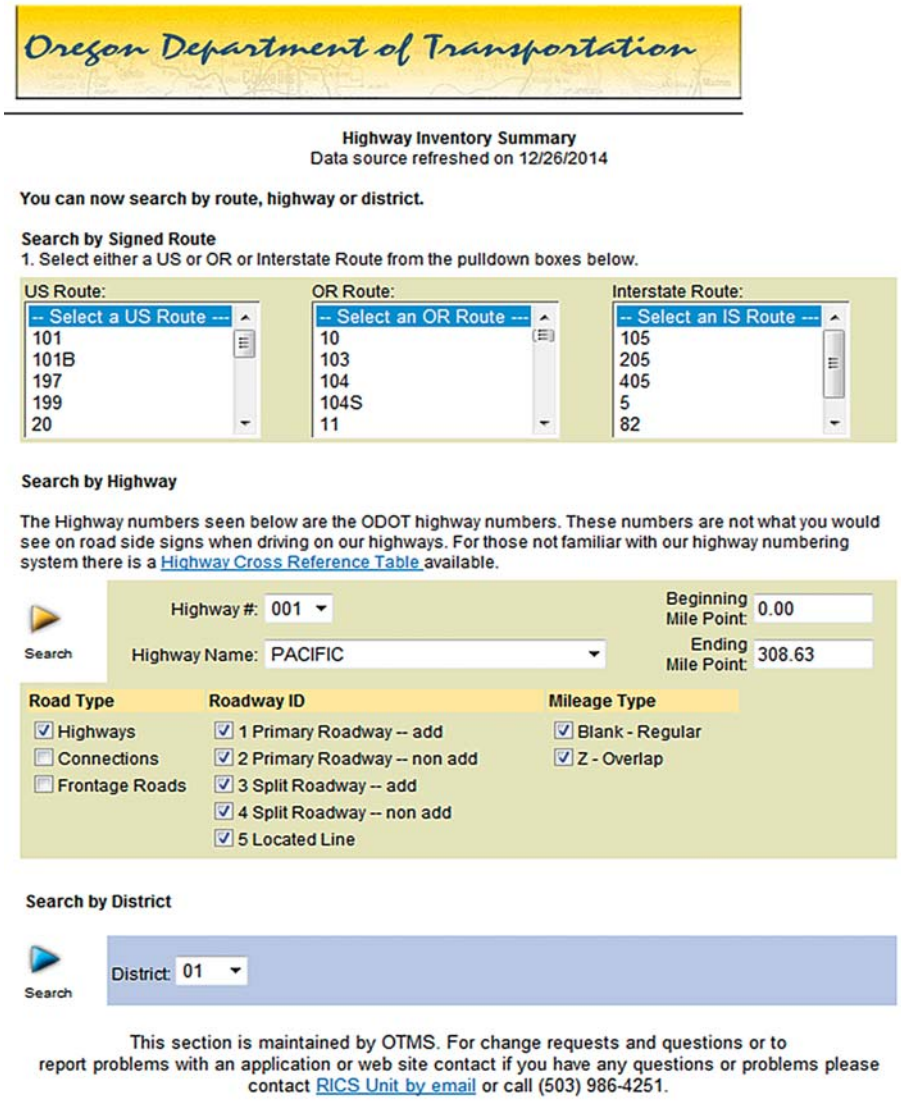
Highway Inventory Summary

Below is a screen print of the web page which you will utilize to access Highway Inventory Summary Reports. As you can see there are several different ways to search for a report; by route, by highway, or by district. Only the search by highway is addressed here. ***Note:*** The Highway Inventory Summary is working from an outdated system. There is currently an initiative to replace this site, but we are still waiting on results. Please contact RICS to get the most updated information on this project.

You can choose to search by either the highway name or the highway number. Once you have selected the appropriate highway all you need to do is click on the search arrow in the upper left corner of the "Search by Highway" section and a list of information about the entire stretch of highway will pop up in a new window. However, you may choose to narrow your search by entering in the milepoints for the segment of road you are inventorying. You could also narrow, or even expand, your search by checking or un-checking the boxes below under "Road Type," "Roadway ID," and "Mileage Type." ***Note:*** When you need a report containing ramp information, be sure to check the "Connections" box.

The following web page can be accessed with the following web link:
http://highway.odot.state.or.us/cf/highwayreports/aml_summary_parms_by_route_no.cfm

A variety of other reports are available here: *http://highway.intranet.odot.state.or.us/cf/highwayreports/*



Appendix E

List of Routes Cross-Referenced with Highway Numbers & Highway Names

http://www.oregon.gov/ODOT/TD/TDATA/Pages/otms/Route_Hwy_CrossRef.aspx

ODOT HWY NO. (RD_ID)	HWY NAME (RD_NAME)	Routes
001	PACIFIC	I-5 OR138 OR99 OR99E US30
002	COLUMBIA RIVER	I-84 US30 US395 US730
003	OSWEGO	OR43
004	THE DALLES-CALIFORNIA	OR216 US197 US26 US30 US97
005	JOHN DAY	OR19 OR206 OR207 US26 US395
006	OLD OREGON TRAIL	I-84 OR203 US30 US395
007	CENTRAL OREGON	OR201 US20 US26 US395
008	OREGON-WASHINGTON	OR11 US30
009	OREGON COAST	OR255 US101
010	WALLOWA LAKE	OR82
011	ENTERPRISE-LEWISTON	OR3
012	BAKER-COPPERFIELD	OR7 OR86 OR86S
014	CROOKED RIVER	OR27
015	MCKENZIE	OR126 OR126B OR242 US20
016	SANTIAM	OR126 US20
017	MCKENZIE-BEND	US20 US97B
018	WILLAMETTE	OR58 OR99
019	FREMONT	OR140 OR31 US395
020	KLAMATH FALLS-LAKEVIEW	OR140 OR39 US97B
021	GREEN SPRINGS	OR140 OR66
022	CRATER LAKE	OR62
023	DAIRY-BONANZA	OR70
025	REDWOOD	OR99 US199
026	MT. HOOD	OR35 US26
027	ALSEA	OR34
028	PENDLETON-JOHN DAY	OR37 US395
029	TUALATIN VALLEY	OR47 OR8
030	WILLAMINA-SALEM	OR22
031	ALBANY-CORVALLIS	US20
032	THREE RIVERS	OR22
033	CORVALLIS-NEWPORT	OR34 US20
035	COOS BAY-ROSEBURG	OR42 OR99

036	PENDLETON-COLD SPRINGS	OR37
037	WILSON RIVER	OR6
038	OREGON CAVES	OR46
039	SALMON RIVER	OR18 OR22 OR233
040	BEAVERTON-HILLSDALE	OR10
041	OCHOCO	OR126 US26
042	SHERMAN	US97
043	MONMOUTH-INDEPENDENCE	OR51
044	WAPINITIA	OR216
045	UMPQUA	OR38 OR99
046	NECANICUM	OR53
047	SUNSET	OR47 US26
048	JOHN DAY-BURNS	US395
049	LAKEVIEW-BURNS	US395
050	KLAMATH FALLS-MALIN	OR140 OR39 US97B
051	WILSONVILLE-HUBBARD	OR551
052	HEPPNER	OR207 OR74
053	WARM SPRINGS	US26
054	UMATILLA-STANFIELD	US395
058	ALBANY-JUNCTION CITY	OR99E US20
060	ROGUE RIVER	OR99
061	STADIUM FREEWAY	I-405 US26 US30
062	FLORENCE-EUGENE	OR126
063	ROGUE VALLEY	OR99
064	EAST PORTLAND FREEWAY	I-205 OR213 OR224
066	LA GRANDE-BAKER	OR203 OR237 OR7 US30
067	PENDLETON	OR37 US30
068	CASCADE HWY NORTH	OR213
069	BELTLINE	OR69 OR126 OR569
070	MCNARY	I-82 US395
071	WHITNEY	OR7
072	SALEM	OR22 OR99EB
081	PACIFIC HIGHWAY EAST	OR214 OR99E
091	PACIFIC HIGHWAY WEST	OR10 OR126 OR126B OR219 OR34 OR99 OR99W US20
092	LOWER COLUMBIA RIVER	US30
100	HISTORIC COLUMBIA RIVER	OR35 US30
102	NEHALEM	OR202 OR47 US101B
103	FISHHAWK FALLS	OR103
104	FORT STEVENS	OR104
105	WARRENTON-ASTORIA	US101B

110	MIST-CLATSKANIE	OR47
120	SWIFT	OR120
123	NORTHEAST PORTLAND	US30BY
130	LITTLE NESTUCCA	OR130
131	NETARTS	OR131
138	NORTH UMPQUA	OR138 OR99
140	HILLSBORO-SILVERTON	OR214 OR219 OR99W
141	BEAVERTON-TUALATIN	OR141
142	FARMINGTON	OR10
143	SCHOLLS	OR210
144	BEAVERTON-TIGARD	OR217
150	SALEM-DAYTON	OR221
151	YAMHILL-NEWBERG	OR240
153	BELLEVUE-HOPEWELL	OR153 OR99W
154	LAFAYETTE	OR154 OR233
155	AMITY-DAYTON	OR233
157	WILLAMINA-SHERIDAN	OR18B
160	CASCADE HWY SOUTH	OR213
161	WOODBURN-ESTACADA	OR211
162	NORTH SANTIAM	OR22
163	SILVER CREEK FALLS	OR214
164	JEFFERSON	OR164
171	CLACKAMAS	OR211 OR212 OR213 OR224
172	EAGLE CREEK-SANDY	OR211
173	TIMBERLINE	OR173
174	CLACKAMAS-BORING	OR212
180	EDDYVILLE-BLODGETT	OR180
181	SILETZ	OR229
189	DALLAS-RICKREALL	OR223
191	KINGS VALLEY	OR223
193	INDEPENDENCE	OR51
194	MONMOUTH	OR194
200	TERRITORIAL	OR200
201	ALSEA-DEADWOOD	OR501
210	CORVALLIS-LEBANON	OR34 US20
211	ALBANY-LYONS	OR226
212	HALSEY-SWEET HOME	OR228
215	CLEAR LAKE-BELKNAP SPRINGS	OR126
222	SPRINGFIELD-CRESWELL	OR222
225	MCVAY	OR225

226	GOSHEN-DIVIDE	OR99
227	EUGENE-SPRINGFIELD	I-105 OR126
228	SPRINGFIELD	OR528
229	MAPLETON-JUNCTION CITY	OR36
230	TILLER-TRAIL	OR227
231	ELKTON-SUTHERLIN	OR138
233	WEST DIAMOND LAKE	OR230
240	CAPE ARAGO	OR540
241	COOS RIVER	OR241
242	POWERS	OR542
244	COQUILLE-BANDON	OR42S
250	CAPE BLANCO	OR250
251	PORT ORFORD	OR251
255	CARPENTERVILLE	OR255
260	ROGUE RIVER LOOP	OR260
270	LAKE OF THE WOODS	OR140
271	SAMS VALLEY	OR234 OR99
272	JACKSONVILLE	OR238
273	SISKIYOU	OR273
281	HOOD RIVER	OR281
282	ODELL	OR282
290	SHERARS BRIDGE	OR216
291	SHANIKO-FOSSIL	OR218
292	MOSIER-THE DALLES	US30
293	ANTELOPE	OR293
300	WASCO-HEPPNER	OR206 OR207
301	CELILO-WASCO	OR206
320	LEXINGTON-ECHO	OR207
321	HEPPNER-SPRAY	OR207
330	WESTON-ELGIN	OR204
331	UMATILLA MISSION	OR331
332	SUNNYSIDE-UMAPINE	OR332
333	HERMISTON	OR207
334	ATHENA-HOLDMAN	OR334
335	HAVANA-HELIX	OR335
339	FREEWATER	OR339
340	MEDICAL SPRINGS	OR203
341	UKIAH-HILGARD	OR244
342	COVE	OR237
350	LITTLE SHEEP CREEK	OR350

351	JOSEPH-WALLOWA LAKE	OR351
360	MADRAS-PRINEVILLE	US26
361	CULVER	OR361
370	O'NEIL	OR370
380	PAULINA	OR380
390	SERVICE CREEK-MITCHELL	OR207
402	KIMBERLY-LONG CREEK	OR402
410	SUMPTER	OR410
413	HALFWAY-CORNUCOPIA	OR413
414	PINE CREEK	OR414
415	DOOLEY MOUNTAIN	OR245
422	CHILOQUIN	OR422
424	SOUTH KLAMATH FALLS	OR140
426	HATFIELD	OR39
429	CRESCENT LAKE	OR429
431	WARNER	OR140
440	FRENCHGLEN	OR205
442	STEENS	OR78
449	HUNTINGTON	US30
450	SUCCOR CREEK	OR201
451	VALE-WEST	OR451
453	ADRIAN-ARENA VALLEY	OR453
454	ADRIAN-CALDWELL	OR454
455	OLDS FERRY-ONTARIO	OR201
456	I.O.N.	US95
480	REDMOND SPUR	US97B
481	BAKER-COPPERFIELD SPUR	OR86S
483	MCMINNVILLE SPUR	OR18
484	ESPLANADE SPUR	US97B
485	FORT STEVENS SPUR	OR104S
486	GOLD HILL SPUR	OR99 OR234
488	CHILOQUIN SPUR	OR422S
489	PARMA SPUR	OR452
490	HOMEDALE SPUR	OR201
491	WEISER SPUR	US95S
492	PAYETTE SPUR	OR52
493	ONTARIO SPUR	US30 US30B

Appendix F

FHWA Standards

ODOT's Roadway Engineering in collaboration with ODOT Audit Services developed the following general assessment of functional condition based on the following criteria for classification:

- **Good** – Meets current, crash test standards.
- **Fair** – Does not meet current standards, but the device is acceptable to leave in place.
- **Poor** – Does not meet the current standards and must be replaced.

Traffic Barrier Functional Conditions

Good

1 - Meets: Height and Length of Need

2 - Good Condition

3 - 350 Compliant

Fair

1 - Meets: Height and Length of Need

2 - Fair Condition

3 - 230 Compliant, but not 350 Compliant

Poor

1 - Does not meet: Height or Length of Need

2 - Poor Condition

3 - Not 230 or 350 Compliant

Terminal and Impact Attenuator Functional Conditions

Good

1 - Good Condition

2 - 350 Compliant

Fair

1 - Fair Condition

2 - 230 Compliant, but not 350 Compliant

Poor

1 - Poor Condition

2 - Not 230 or 350 Compliant

350 Compliant – 230 Compliant – Not 230 Compliant Definitions

350 Compliant

Type 2A Guardrail Spacing

Guardrail Terminals -	SKT FLEAT SRT BIBS ET2000
Impact Attenuators -	REACT CAT Brakemaster RACC Quadgard – wide or narrow
Concrete Barrier Connections -	C channel bolted connection – Tall F & Single Slope 6 loop pin & loop

230 Compliant

Impact Attenuators -	GREAT Hexfoam Sandwich
Concrete Barrier Connections -	4 loop pin & loop

Not 230 Compliant

Post Spacing -	Type 1, Type 1A, Type 2
Guardrail Terminals -	Blunt A Blunt B Blunt C BCT Texas Twist or Turned down w/no twist
Rail Type -	Half Moon, Flying W
Impact Attenuators -	Hydro Sandwich
Concrete Barrier Connections -	Tongue & Groove

Remember: This information is current as of August 2008, however, these standards are changing frequently. For more information visit the following webpage on FHWA's website: *http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/*

FHWA Compliance Standards

Updated by: Kayl Enders, AMI, 9/10/14			
Hardware	**350 Compliant**	**230 Compliant**	**Pre 230**
Terminal			
SKT, SRT, Burried in Back Slope, Cable Barrier Terminal, ET 2000, FLEAT	x		
NONE		x	x
OTHER		x	
Blunt A, Blunt B, Blunt C, Breakaway Cable terminal		x	x
Sloped End Unburied		x	x
Mound			x
Turned Down End (Texas Twist)			x
Impact Attenuator			
BreakMaster, IA-CAT 350, IA-QUADTREND, IA-Sentre, IA-QuadGuard (Narrow or Wide), IA-QUEST, IA-React, IA-Sand Barrels, IA-SCI 100 GM, IA-TAU II, IA-TRACC	x		
IA-GREAT, IA-Hexfoam Sandwich		x	
IA-Hi-Dro Sandwich			x
Transitions			
Tran-350, Tran-CB/GR	x		
Tran-230		x	
Tran-PRE-230			x
Barr Desc			
3-STRAND, 4-STRAND	x		
THRIE, W Beam (*all)	x		
MOD. THRIE	x		
SBT, TWO RAIL SBT	x		
F, TALL_F, Jersey	x		
SS	x		
ROUND TIMBER		x	
HALF MOON, FLYING W			x
Conc Conn			
C-Channel, 6 Pin and Loop	x		
4 Pin and Loop		x	
Tongue and Groove			x
Post Space			
Type 1, Type 1A, Type 2			x
Type 2A	x		
Type 1 and Type 2A			x
Type 1A and Type 2A			x

The Functional Condition of the hardware listed above is Good for 350 Compliant, Fair for 230 Compliant, and Poor for Pre-230 items.

Appendix G

Data Collection Tips

- TransInfo requires all values to be in UPPER CASE.
- The values must match the Domain values for each attribute.
- Leading/trailing spaces are not allowed
- Records can only be added to currently valid highway segments. If a section of highway has been removed from the highway system by Jurisdictional Transfer, inventory, etc. or is within a milepoint equation then an asset cannot be added to that location.
- An asset cannot have the same begin and end milepoint. If the guardrail is very short the End Milepoint should have 0.001 added to its value. (Example: A guardrail is only 10 feet long. If the Begin MP is 2.45 then the End MP would be 2.451)
- The "Note" field is limited to 100 characters - please separate multiple notes with a semicolon (;).
- Commas, Bar (|), or At sign (@) cannot be used in the Note field or any other free text field.
- The 4P&L, 6P&L, T&G values in the Concrete Barrier Connector Method attribute domain need to be changed to 4PL, 6PL, TG

Appendix H

Abbreviations For Data Entry

	Term	Abbreviation
Side of Road	Left	L
	Right	R
	Center	C
Terminal Type	None	None
	Sloped End Unburied	Sloped End
	Connected to Structure	Conn. to structure
	Buried in Mound	Mound
	(Buried in Back Slope)	BIBS
	Blunt A	Blunt A
	Blunt B	Blunt B
	Blunt C	Blunt C
	BCT (Breakaway Cable Terminal)	BCT
	Turned Down End (Texas Twist)	TDE
	ET 2000	ET 2000
	SKT	SKT
	FLEAT	FLEAT
	SRT	SRT
	Other	Other
	IA-SENTRE	IA-SENTRE
	IA- Sand Barrels	IA-Sand Barrels
	IA-Hi-Dro Sandwich	IA-Hi-Dro Sandwich
	IA-QuadGuard (Narrow or Wide)	IA-QG
	IA-QuadGuard Elite	IA-QGE
	IA-QuadTrend	IA-QT
	IA-BrakeMaster	IA-BrakeMaster
	IA-REACT	IA-REACT
	IA-CAT 350	IA-CAT
	IA-TRACC	IA-TRACC
	IA-SCI 100 GM	IA-SCI 100
	IA-Hexfoam Sandwich	IA-Hexfoam Sandwich
	IA-GREAT	IA-GREAT
	IA-QUEST	IA-QUEST
	IA-TAU II (Narrow or Wide)	IA-TAU II
	IA-Other	IA-Other
	Tran-Pre 230	Tran-Pre 230
	Tran-230	Tran-230
	Tran-350	Tran-350
	Tran-CB/GR	Tran-CB/GR
	Continues down offramp	Cont. down offramp
	Continues down side road	Cont. down side road
	Continued from onramp	Cont. from onramp
	Continued from side road	Cont. from side road

Terminal Height	Low	L
	OK	O
	High	H
Terminal Condition	Good	G
	Fair	F
	Poor	P
Rail Type	W Beam Galvanized	Galv.
	W Beam Painted	Paint
	W Beam CORTEN	CORTEN
	W Beam w/Rubrail	Galv. w/Rubrail
	Half Moon	Half Moon
	Flying W	Flying W
	Thrie	Thrie
	Modified Thrie	Mod. Thrie
	Round Timber	Timber
	Steel Backed Timer	SBT
	Two Rail Steel Backed Timer	Two Rail SBT
	Other	Other
Post Spacing	Type 1	1
	Type 1A	1A
	Type 2	2
	Type 2A	2A
	Other	Other
Post Type	Wood	Wood
	Steel	Steel
	Concrete	Concrete
Rail Height	Low	L
	OK	O
	High	H
Rail Condition	Good	G
	Fair	F
	Poor	P
Cable Barrier Type	3-Strand	3-Strand
	4-Strand	4-Strand
Cable Barrier Height	Low	L
	OK	O
	High	H
Cable Barrier Condition	Good	G
	Fair	F
	Poor	P
Concrete Barrier Type	Jersey	Jersey
	F Shape	F
	Tall F	Tall F
	Single Slope	SS
	Other	Other

Concrete Barrier Construction Method	Precast	Precast
	Cast in Place	CIP
Concrete Barrier Connection	Tongue & Groove	T & G
	4 Pin & Loop	4 P & L
	6 Pin & Loop	6 P & L
	C Channel	C Channel
Concrete Barrier Height	Low	L
	OK	O
	High	H
Concrete Barrier Condition	Good	G
	Fair	F
	Poor	P

Comments
Inventory Year