Chapter

11

ROADSIDE INVENTORY, DESIGN PROCEDURES, SURVEY, AND RIGHT-OF-WAY

GENERAL

The purpose of this chapter is to provide the designer with a general outline of the roadside inventory procedure, general survey information, and a general discussion regarding the design procedures from STIP Development to the production of plans, specifications, and estimates. The last section of this chapter provides general information to the designer on right of way. Information is provided on; the acquisition process, property rights, property conveyance documents, and access rights. The Project Delivery Guidebook provides detailed information on the project development process. The Highway Design Manual is not intended to provide the scope of information that a surveyor would need to complete the work described in this Chapter.

11.1 ROADSIDE INVENTORY

11.1.1 GENERAL

For 1R, 3R, and 4R projects, some form of a roadside inventory shall be made of roadside features that do not conform to AASHTO's *"Roadside Design Guide - 2011"* and/or AASHTO's *"A Policy On Geometric Design Of Highways And Streets – 2011"* Geometric Design Standards or nongeometric design standards (such as structural strength, safety features and traffic control, etc.). This inventory shall be completed regardless of funding category. In addition to the inventory, a traffic study of crash locations shall be conducted. The designer should use this data in the development and design of the project.

The level of detail of the roadside inventory will vary between projects. This section provides direction on roadside inventory guidance for, 1R, 3R, and 4R projects. 1R Preservation projects will require less roadside inventory work than 4R (New Construction or Reconstruction) projects. Roadside inventory for 3R projects will vary depending upon the project scope and purpose. This section should help the roadway, traffic, and other designers in providing level of survey detail required to the Project Team. The main purpose of the roadside inventory is to note substandard design features, but it can also be used to inventory existing features for mapping and bid item purposes, and to maintain and update asset inventories.

The FACS-STIP Tool and associated user guides provide additional information to assist developing a roadside inventory for all projects.. The FACS-STIP Tool provides data on over 32 highway features or attributes such as; freight routes, vertical clearance routes, state highway classification, functional classification, ORS 366.215 routes, etc. The FACS-STIP Tool allows the Department to maintain an up-to-date data base system. The FACS-STIP Tool is required to be used on 1R projects and should be used for 3R and 4R projects in an effort to maintain an accurate and up to date asset inventory. This asset management approach is in line with ODOT's practical design strategy by maintaining, upgrading, and operating physical assets in a strategic manner. Appendix F provides general information on using the FACS-STIP Tool.

11.1.2 ROADSIDE INVENTORY ANALYSIS AND DESIGN EXCEPTION PROCESS

The 2011 AASHTO *"Roadside Design Guide"* provides information and operating practices related to roadside safety. A design exception process has been developed for those project specific non-standard roadside features that are identified in the roadside inventory. Any non-standard equipment or non-standard clear zone feature that will not be corrected as part of the project will require a design exception. Chapter 14 outlines the steps responsible parties should take in dealing with design exceptions and the inventory/analysis of 1R, 3R, and 4R projects. 1R projects typically maintain an "as is" condition and do not require design exceptions as the 1R

program identifies safety elements to be addressed with an asset management strategic program basis. As discussed in Chapter 14, 4R clear zone design exceptions are approved by the State Traffic- Roadway Engineer while 3R clear zone design is the responsibility of the Region Technical Center. See Section 4.6 and Chapter 14 for detailed information regarding clear zone, existing barrier systems, and equipment upgrades for 1R, 3R, and 4R projects.

11.1.3 ROADSIDE INVENTORY FOR 4R PROJECTS AND SPIS SAFETY PROJECTS

11.1.3.1 PURPOSE

The purpose of the inventory is to identify all objects and configurations that do not conform to the 2011 AASHTO *"Roadside Design Guide"* and AASHTO's *"A Policy On Geometric Design Of Highways And Streets – 2011"* Geometric Design Standards and nongeometric standards (nongeometric standards relate to structural strength, safety features and traffic control). 4R projects shall have a full roadside inventory completed and should be brought up to full standards, including sight distance, horizontal and vertical alignment, and ADA requirements. In addition, safety projects identified through the Highway Safety Program (Top 10% SPIS, Benefit/Cost, justified by risk) shall have a full roadside inventory completed.

The clear zone concept is discussed in the 2011 AASHTO "Roadside Design Guide". This guide provides an excellent elaboration on the clear zone concept and is a valuable working tool.

11.1.3.2 GUIDELINES

Region scoping forms and the FACS-STIP Tool were developed to assist project teams in the scoping effort. The Region scoping forms and/or the FACS-STIP Tool should be used to provide an inventory of conforming and nonconforming objects and provide appropriate details to be used in the development of the project.

All non-conforming items to be inventoried should include, but not be limited to the list of items below:

1. Trees
2. Rock Outcrops
3. Steep Cut or Fill Slopes (1:3 or steeper)
4. Barriers (Guardrail , Cable Rail, and Concrete Barrier)
5. Impact Attenuators
6. Bridge Rails
7. Signs

8. Luminaires
9. Drainage Facilities
10. ADA Ramps
11. Bicycle Facilities
12. Sidewalks
13. Bridges
14. Utilities
15. Other

    - Roadway Surfaces and Dimensions
    - Sight Distances
    - Driveways
    - Mailboxes
    - Structure Columns
    - Signals, ATR and ITS structures
    - Drop-offs at Pavement Edge
    - Cattle and/or Equipment Pass Headwalls

1. Trees present some interesting problems. The easy recommendation is to remove them if they are within clear zone, but in many cases the public sentiment is to save them at almost any cost. Some trees may be entitled to specific protection because of historic or ecological significance. Reasonable protection, such as extending a barrier required for another obstacle, may be more expensive but also more acceptable to the public. Careful analysis of crash history at the site, evidence of the tree being hit, location (such as near outer edge of clear zone on inside of a curve), and public attitude (particularly in urban areas), may indicate an exception should be requested to allow the tree to remain. See Chapter 4 regarding street and median trees.

2. Rock outcrops in cut slopes can sometimes be removed, but large outcrops or solid rock cuts may need guardrail or barrier protection. These are easily overlooked as they have seldom been considered for protection. Decisions on the proper protection of slopes must be made only after considering the magnitude of the problem and the costs involved.

3. Cut or fill slopes steeper than 1:3 require protection. While slope flattening is the desirable action, primarily 3R projects, and at times, 4R projects seldom have adequate material available and R/W is frequently inadequate. Flattening may not be feasible due to streams or wetlands at the toe of the fill. Provision of barrier, guardrail, or cable rail is the usual solution. While vehicles can traverse a 1:3 slope, they cannot recover and the large clear zone required (over 120 feet at 70 mph) frequently cannot be provided within the R/W.

   Cut slopes steeper than 1:3 within the clear zone should be flattened or considered for protection. Provide a 1:3 or 1:4 "safety slope" area at the bottom of steeper cuts if

possible. Decisions on the proper protection of slopes must be made only after considering the magnitude of the problem and the costs involved.

4. Barriers include guardrail, cable rail, and concrete barriers. Barrier that does not meet NCHRP-Report 230 criteria must be replaced. Guardrail must be checked against current standards for type of rail, height, flare rates, anchors, bridge connectors, terminals, lap direction, miscellaneous hardware, etc. If the terminal can be buried in the backslope it should be considered even though only a flare may be required. Concrete barrier sloped ends are allowable only when design speed is less than 45 mph or the sloped end is outside the clear zone.

   Concrete barrier shall meet current standards for size and shape. Consider the effect of overlays, past or present. At the base of the barrier the finished surface of the overlay must not be higher than the top of the vertical 3 inch portion of the barrier for proper functioning. Flare rates and terminal treatments (buried end, etc.) must conform with current standards. Narrow base barrier must be supported with embankment behind it.

   Guardrail protecting fixed objects needs approximately 6.5 feet from face of rail to object to provide space for adequate deflection. If deflection room cannot be provided, contact the Senior Roadside Design Engineer for possible solutions. Exposed guardrail and barrier ends that cannot be properly flared or buried, such as in exit ramp gores, should be protected with an impact attenuator.

5. Existing impact attenuators must meet NCHRP-Report 230 criteria and be properly maintained with no modifications that are not approved by the manufacturer. A careful inspection by experienced personnel using the manufacturer's specification book should be done. The District Manager, Bridge Engineering, Senior Roadside Design Engineer, or manufacturer's representative may be appropriate sources of expert assistance.

6. The 2011 AASHTO Roadside Design Guide identifies acceptable bridge rail shapes. If in doubt as to acceptability of a particular rail type, consult Bridge Engineering. The concrete "safety shape" should be used on freeways. Guardrail connections to bridge rail are a critical area. Chapter 7 of the “Roadside Design Guide”, Bridge Railings and Transitions provides an excellent guidance.

7. Signs must be mounted on breakaway posts if within the clear zone. The need for a multidirectional breakaway base should be considered. The slope on unidirectional single-support breakaway bases must be in the correct direction.

   Breakaways must not be in the ditch and should be at or above the ground surface, but not over 4 inches above the surface. Proper bolts, washers, slip plates, etc., must be in place with no modifications, such as welding, that may alter the function of the breakaway.

   The hinge mechanism must also have all hardware in place. No auxiliary sign panels should span the hinge in such a way as to alter its function. The hinge mechanism should be a minimum of 7 feet, above the ground. On fills the nearest sign post should be at least 30 feet outside the edge of the traveled way (fog line) so the vehicle will not be

airborne when it strikes the sign. Signs mounted on wood posts must not have concrete foundation collars or support plates. Wood post installations must comply with the Oregon Standard Drawings.

8. Luminaires must have frangible or slip bases if within the clear zone. Some older frangible bases may not function properly with the newer small cars. Consult the Traffic Structures Engineer for acceptability of specific frangible bases. If luminaires cannot be readily relocated or protected, a study of the need for them should be considered. Eliminating them may be less hazardous than retaining them.

9. Drainage facilities should be studied carefully. Many transverse or longitudinal culverts may need stabilization, rehabilitation, or replacement. The structural integrity of each drainage facility should be evaluated prior to considering extending the culvert for widening a roadway. Contact the Highway Maintenance Supervisor for the project area for information pertaining to the existing culvert when the structure is less than 48 inches in diameter. If the culvert 48 inches in diameter or larger contact the Geo/Hydro Unit or the Region Hydraulics Engineer for assistance. If inadequate information is available, a thorough culvert inspection should be performed per Drainage Facilities Management System (DFMS) procedures.

   Many cross culverts can be lengthened to eliminate open ends, outlet ditches, etc., within the clear zone. Even though paved end slopes exist, they may not provide a safe end, since many of the 1:3 paved ends are inletted into 1:4 or 1:6 slopes, creating a ditch across the clear zone. Paved end slope installations must be constructed as shown in the Oregon Standard Drawings, with particular attention to warping or contouring the slope as shown.

   Metal end sections on culvert pipes require appropriate end treatments. Safety end sections should be considered on larger pipes (See Oregon Standard Drawings). Recontouring around some existing paved end slopes must be considered if erosion and settlement have allowed the upper end of some paved end slopes to project more than 6 inches above the ground.

   Longitudinal drainage ditches must be uniform and not eroded. Pipes under driveways and crossroads are to be reviewed to determine compliance with the Roadside Design Guide so that vehicles hitting them are not stopped abruptly or launched into the air. Type "M-E" or "M-O" inlets or modifications of them, may be required to accomplish these flatter end slopes. Pay particular attention to crash history when evaluating these features.

10. Most inventories for preservation and 4R projects are in conjunction with overlay or paving projects so correction of poor pavement conditions is an integral part of the project. Drop-offs, roughness, raveling joints, etc., must be analyzed if repaving is not already part of the proposed project.

Certain design elements can best be analyzed in the office using "As Constructed" plans. These include horizontal and vertical alignment and typical sections. Elements such as sight distance

for merges, lane drops, road approaches, and intersections should also be analyzed in the field so the interaction of all elements can be better evaluated.

A broad viewpoint must be maintained so that possible hazards that don't fit conveniently in the categories already mentioned are not overlooked. Utilities (poles, valves, etc.) slope breaks that can launch a car or stop it as solidly as a barrier, cattle and equipment passes hidden by vegetation, erosion around culvert ends hidden by weed growth, etc., are easily overlooked. Shoulders on structures should be full width, according to current standards.

11.1.3.3 REFERENCES

A working knowledge of the 2011 AASHTO "*Roadside Design Guide*", the Project Delivery Guidebook, the Highway Design Manual, and AASHTO's "*A Policy On Geometric Design Of Highways And Streets – 2011*" will assist in project scoping and data information collection. A good understanding of how the clear zone requirement is determined by considering design speed, side slope, ADT, and curvature is needed. All nonconforming items are to be inventoried, even though it may appear to be difficult to bring them into conformance with the appropriate standard. ODOT's Practical Design Strategy document provides guidance in respect to project scope, economics and practicality of upgrading nonconforming elements.

11.1.4 ROADSIDE INVENTORY FOR 3R PROJECTS

11.1.4.1 GENERAL

The design process outlined below provides guidelines for developing a roadside inventory for 3R projects. The scoping team should determine the level of effort that will be required by the survey crew. As discussed in the 4R Roadside Inventory, Region Scoping forms and/or the FACS-STIP Tool were developed to assist project teams capturing the roadside inventory for 3R projects. Very definite parameters should be set as to which roadside obstacles need to be inventoried. The intent of the inventory for 3R projects is not to survey to the level of a 4R project. Not every object near the roadway that may constitute a substantial hazard should be inventoried. Continuous runs of utility poles or trees at the R/W line generally don't need to be inventoried. However, the level of effort and area covered in the inventory should be increased for locations where there are a number of run-off-the-road crashes, or locations that tend to have high crash frequency, such as tight horizontal curves.

Other than roadside features, the field work on these projects should be limited to the amount needed for quantity calculations, in particular leveling for crown and super correction, lane and shoulder widths, bridge widths, existing rumble strips, pavement detection loops, and, in general, the amount of work needed to address the 3R requirements. By their nature, urban projects may require some additional work but every effort should be made to limit the survey work to the minimum needed for the particular project.

During project scoping, the need for exceptions to design standards should be identified. Design exception requests can be submitted as soon as the need is identified or, at the latest, as part of the Design Acceptance Package (DAP). For further information on design exceptions, see Chapter 14. As previously discussed, 3R clear zone design is the responsibility of the Region Technical Center.

11.1.4.2 ROADSIDE INVENTORY

By their nature, preservation projects on sections of highway having low crash history place special emphasis on pavement preservation even while recognizing that certain cost effective safety improvements may be necessary and desirable. Due to good safety performance and limited scope, roadside inventories on these sections should be limited to the following areas:

1. Roadside Obstacles Within Clear Zone or R/W
    - Trees
    - Luminaires
    - Utility Poles
    - Misc. Fixed Objects (mail boxes, fire hydrants, railroad crossing warning devices, etc.)
2. Existing Guardrail, Cable Rail, and Concrete Barrier, including Bridge Rail Connections
3. Public Road Intersections with Stopping Sight Distance Less Than ODOT New Construction Standards
4. Horizontal Curves More Than 15 mph below project design speed, and the current year ADT is 2000 or greater.
5. Vertical Curves More Than 20 mph below the project design speed (Current year ADT greater than 2000), Hiding Intersections, Sharp Horizontal Curves, or Narrow Bridges
6. ADA Deficiencies

Following is a further explanation of the above inventory items and some thoughts on appropriate mitigation measures that may be incorporated on this type of project.

1. Roadside Obstacles - With the emphasis on pavement preservation, the inventory of roadside obstacles is limited under most circumstances to R/W or clear zone, whichever is less. Inventories wider than clear zone are not considered a good expenditure of engineering budgets as only under unusual circumstances will substantial widening or realignment be included in the project. The survey crew should rely on the scoping report from the project team and the project developmenet team for guidance on the level of effort to be expended on the inventory of roadside obstacles.
2. Existing Guardrail - All existing guardrail including bridge connections and end treatments should be inventoried. Guardrail terminals rated as passing NCHRP Report

230 criteria can remain in place. Bridge connections shall consist of positive bridge connection, transition guardrail, and current standard terminal. During the inventory/analysis process, the project team should also be looking for opportunities to modify existing installations that do not adequately protect obstacles either by extending or burying ends in cuts, or considering new runs based on existing obstacles. Once any portion of the guardrail installation is modified, even for height, the entire run must be brought to new construction standards or a design exception must be obtained from the State Traffic-Roadway Engineer.

3. Intersection Sight Distance - Most of this analysis can be done in the office from As-Constructed Plans. Many times those intersections with deficient sight distance will also show up during the crash analysis. These intersections will probably have opportunities to incorporate low cost mitigation elements with the project to diminish crash potential. Deficient intersections should be reviewed on-site with the Region Traffic Engineer to aid in identifying mitigation measures.

4. Horizontal Alignment - Horizontal curve deficiencies can best be identified by a review of As-Constructed plans, but superelevation rates need to be measured in the field. As a minimum, superelevation should be corrected as close as reasonably possible to the new construction standard with the project. Additional mitigation (delineation, signing, etc.) may also be appropriate due to site-specific conditions. Again, the Region Traffic Engineer should be consulted for input.

5. Vertical Alignment - As-Constructed Plans should be used as a starting point for identifying vertical alignment deficiencies. Field verification is needed to determine if major driveways or intersections are hidden by the vertical curves. If a crash history exists at these locations or horizontal curve locations, it may be appropriate to include major safety improvements with the project. This need should be identified early, during project scoping, so funding can be procured.

6. Americans with Disabilities Act - ADA deficiencies are predominantly limited to urban preservation projects. ADA accommodation is more than a standard; it is a legal requirement. Intersection accommodation by installation of sidewalk ramps upgrade is an absolute minimum regardless of jurisdictional ownership of the sidewalks. Driveways and sidewalk obstacles should be carefully reviewed for candidate improvements and may provide good opportunities to partner with local jurisdictions for a better overall facility.

11.1.5 ROADSIDE INVENTORY FOR 1R PROJECTS

11.1.5.1 SIGNIFICANCE OF THE 1R ROADSIDE INVENTORY

The implementation of the 1R Preventative Maintenance Paving Program along with the 1R Safety Features Upgrade Program mark a fundamental change in ODOT's approach to

maintaining the highway system while systematically improving safety.

1. Safety improvements traditionally included in 3R projects are now addressed separately on a statewide priority basis under the 1R Safety Features Upgrade Program.

2. To successfully upgrade safety features on a statewide priority basis, an up-to-date inventory of such features must be maintained. The 1R Roadside Inventory is currently the required means of maintaining the statewide safety features inventory.

3. Implementation of the 1R Safety Features Upgrade Program along with a reliable means to maintain the statewide inventory of safety features was key to FHWA's approval and support of the 1R Preventative Maintenance Paving Program.

4. FHWA's continued support of the 1R Preventative Maintenance Paving Program is contingent on the success of the 1R Safety Features Upgrade Program. Therefore, the importance of completing the 1R Roadside Inventory cannot be overemphasized.

11.1.5.2 1R ROADSIDE INVENTORY SAFETY FEATURES AND DATA ELEMENTS

A 1R project may not go to bid if the inventory is not complete, unless authorized by the 1R Program Manager.

The following items are included in the 1R Roadside Inventory:

Note: Culverts are no longer required as part of the 1R Roadside Inventory because dedicated funding is currently available for the culvert inventory. Culverts may be required as part of the 1R Inventory in the future if dedicated funding is no longer available.

1. Traffic Barriers

    - Location of Barriers (Highway Number, Begin and End Milepoint)
    - Terminal Type
    - Impact Attenuator identification
    - Barrier Type- Concrete, Guardrail, Cable, etc.
    - Barrier Height
    - Barrier Condition

2. ADA Ramps (See Roadway Technical Advisory RD13-01A on ADA Ramps)

    - Cross Street Name
    - Physical Condition
    - Running Slope
    - Counter Slope
    - Cross Slope
    - Lip Height
    - Clear Width

- Detectable Warning
- Level Landing
- Slope Differential
- Functional Condition

3. Bridges

    - Location (Highway Number and Milepoint)
    - Deck Width

4. Bicycle Facilities

    - Location (Highway Number, Begin and End Milepoint)
    - Bike Facility Type (Bike Lane, Shared Lane and Shoulder, etc.)
    - Bike Lane Width
    - Bike Lane Condition

5. Sidewalks

    - Location (Highway Number, Begin and End Milepoint)
    - Sidewalk Surface (PCC or AC)
    - Sidewalk Buffer (Yes or No)
    - Sidewalk Width
    - Sidewalk Condition

6. Signs

    - Location (Highway Number and Milepoint)
    - Side of Road (Left or Right)
    - Sign Legend
    - Sign Width and Height Estimate
    - Sign Support Type and Size
    - Number of Posts
    - Recommended Replacement (Yes or No)

11.2 DESIGN PROCEDURES

11.2.1 GENERAL

The purpose of this section is to provide the designer with a general outline of the design procedure from the point of project creation to the production of Plans, Specifications, and Estimates. This section is not all inclusive of all design features but will provide the designer with a general basis on how projects are designed through the project development process, including final STIP project selection process. The Project Delivery Guidebook provides detailed information on the project development process and the different tasks associated with getting a project to contract.

11.2.2 STIP PROGRAM DEVELOPMENT

The program development phase is the process where projects are created through the transportation planning process to the approval of the Oregon Transportation Commission into the Statewide Transportation Improvement Program (STIP). There are five major milestones in this process including (See the Project Delivery Guidebook for detail on the milestones):

1. Transportation Planning
2. Management Systems Analysis
3. Identify Potential Projects
4. Draft Scope, Schedule, Cost Estimate (Draft STIP)
5. Project Selection (Final STIP)

As part of this process, designers will be part of scoping teams, development of purpose and need statements, and potential solutions to an identified problem statement. The end result of this phase is the development of the draft STIP and projects selected for the final STIP.

11.2.3 PROJECT DEVELOPMENT PROCESS

The project development phase begins with the assignment of a project from the approved STIP to the preparation and readying of the project for bid letting. There are seven major phases of the project development lifecycle process that designers should participate in the process. The seven phases and typical work the designer is associated with include:

1. Project Initiation - Tasks include the establishment of the project team and the review and confirmation of the project scope. During this task, the designer may need to provide conceptual designs that address the project problem, purpose and need statement, and scope as addressed in the project prospectus.

2. Survey, Maps, Engineering and Environmental Reports - Depending on the type of project, the designer may need to participate in determining the type of survey information required for the project. Other task work involved may include: Hazardous Materials Corridor study; the Environmental Baseline report; Area of Potential Impact maps; Work Zone Traffic issues; Pavement design; and Traffic Counts and Preliminary Traffic Analysis.

3. Design Acceptance Phase (DAP) - The DAP milestone is a critical decision point for the designer as the project geometry boundaries are set to enable other activities such as right of way, Environmental permitting, and construction contract work to begin. The designer will typically deliver the roadway design, stage construction design, design narrative, and potentially the traffic control plans and interchange layout sheet during this task. The design narrative should provide a summary of the alternative analysis. Some of the deliverables for the designer at DAP may include:

    - Preliminary horizontal and vertical geometry alignments
    - Typical sections
    - Superelevation
    - Cut and Fill Slopes, Materials, and Earthwork
    - Guardrail, Concrete Barrier, Cable Barrier
    - Preliminary Drainage, Erosion Control, and Stage Construction design
    - Preliminary Quantity and Cost Estimate
    - Completion of the Roadside Inventory
    - Design Exception requests
    - Design Narrative
    - Design Maps, Profiles, Cross-Sections, and other deliverables

    The designer should also be aware of the coordination with other disciplines including but not limited to:

    - Utilities
    - Right of Way
    - Bridge
    - Geo/Environmental
    - Traffic Control
    - Pavements
    - Traffic
    - Transportation Analysis
    - Bicycle and Pedestrian
    - Office of Project Letting (OPL)
    - Rail

- Aeronautics
- Access Management
- Motor Carrier
- Local Agencies and other Stakeholders

4. Right of Way and Permits - During this stage, a number of right of way and permit functions are performed. Some of the tasks at this stage include; final right of way map and property descriptions; right of way acquisition; railroad encroachment map; right of way certification. Other tasks include obtaining required permits involving wetlands, fish passage, utilities, railroad, airport clearance, and others.

5. Preliminary Plans for Construction - The main purpose of this stage is additional technical and construction review of the project plans prior to Advance Plans. Other tasks conducted in this phase include: update of the communication plan; noise mitigation; access management procedures; revision of estimates; and preliminary special provisions.

6. Final Plans and Special Provisions for Construction - This stage include the work conducted after the Advance Plans-Plans in Hand meeting. It is the last opportunity for technical review before the PS&E milestone. Final plans, cost estimate, construction schedule, and special provisions are deliverables during this stage.

7. Plans, Specifications, and Estimates for Construction - This stage involves the process where the project is considered complete and ready for bid advertisement through Commission Services.

11.3 GENERAL SURVEY PROCEDURES

Location surveys are performed to provide the designer with information about the project site. The products generated by the location survey depend upon the type and scope of the project. These products may include: Geodetic Control Monuments, Horizontal Control Network, Vertical Control Network, Planimetric Map, Digital Terrain Model (DTM), Property Monument Recovery Map, existing right of way Centerline and Boundary Resolution Map, and a variety of other specific purpose maps, such as Utility, Airport Permit, Railroad Encroachment, etc.

For detailed ODOT survey procedures contact the ODOT Geometronics Unit.

11.3.1 LAND SURVEY LAW

It is ODOT policy that licensed land surveyors, in appropriate positions, are responsible for land surveying practiced under their supervision including conformance to all state statutes pertaining to survey and land laws. This includes but is not limited to the following statutes:

- ORS 92 Subdivisions and Partitions
- ORS 93 Conveyancing and Recording
- ORS 209 County Surveyors
- ORS 672 Professional Engineers, Land Surveyors, Geologists

In addition to the requirements of state law, the Chief Engineer has directed that:

1. The Project Manager, Region Survey Manager, or Region Technical Center Manager shall contact the appropriate County Surveyor upon commencement of any field location surveys. This will keep the County Surveyor informed of work within their jurisdiction. For government monuments in danger of being destroyed by construction activities, arrangements should be made with the appropriate County Surveyor for monument referencing or replacement. (Use *"Project Notification to County Surveyors"* form # 734-2298)

2. Copies of field notes with references to found and/or set monuments will be furnished to County Surveyors upon request.

11.3.2 SURVEY TYPES

11.3.2.1 GEODETIC CONTROL SURVEY

Geodetic Control Surveys cover a large area and take into account the curvature of the earth. They are executed to specified accuracies and standards and may be used to provide primary control for projects. These surveys provide monuments that are connected to the Oregon High Accuracy Network (HARN). Project Horizontal and Vertical Control Networks may be based on Geodetic control in the vicinity.

Information concerning the HARN is available from the ODOT Geometronics Unit. The Geometronics field crew will, upon request, establish geodetic control points where none exist in the vicinity of the job.

11.3.2.2 CADASTRAL SURVEY

Acquisition of land for highway right of way requires a Cadastral Survey to establish existing property lines and to establish and monument new boundaries. This work must be done in compliance with the laws of the State of Oregon and within the "*Rules of Professional Conduct*" for practicing land surveyors as defined by the State Board of Examiners for Engineers and Land Surveyors. (See OAR 820-020-0005.)

11.3.2.3 TOPOGRAPHIC SURVEY

Topographic Surveys are made to determine the relative position of points on or near the surface of the earth so that maps showing a plan view of an area can be made. Topographic maps show natural and synthetic features and are used in the planning and design of highways, subdivisions, parks, etc. It is common practice to collect topographic data with an electronic theodolite and data collector. The survey crew records code information along with the measurements to instruct the computer in processing the data. The data is downloaded and processed into a 3D digital map. This digital map is stored in real world coordinates (1:1 scale) and can be plotted at any scale required.

The topographic map should generally include the following:

1. Fences: measurements to the fences should be taken at frequent intervals. All intersecting fences should be tied.

2. Approach Roads: Note the grade, type of surfacing, width, name, private approach or public, controlling agency, direction and distance to nearby towns.

3. Utilities: Locate all utility lines both above ground and underground, even though it may not be necessary to move them. Note the name of the owners, pole numbers, number of wires, pipe sizes, depths, and flow lines. Frequently the local utility company will assist in the location of their facilities. The right of way Liaison Agent may be of help in determining a property owner's independent source of water, underground pipes, septic tank, drain field and other important features which must also be shown on the map.

4. Improvements: Locate buildings, orchards, improved lands, etc., adjacent to the project. Field tie all buildings on properties that may have a R/W taking or potential for flooding.

5. Irrigation Facilities: Note irrigation ditches and show the direction of flow, the grade, typical section, size of structure, centerline station and angle of the crossing.

6. Bridges: Show stationing at both ends, width of roadway, type of bridge, type of rail, dimensions of walks, etc.

7. Railroads: Show centerline stationing of both highway and the railroad at their intersection and the angle of crossing. Tie in head blocks, switches, culverts, bridges, etc. Where the highway runs adjacent to a railroad, frequent ties should be made to the facility.

8. Terrain: Designate whether the area is cultivated, forested (note if recently logged), marsh, or rangeland. Also note the character of the ground such as clay, rocky, etc. Locate any significant grade breaks or changes in vegetation.

9. Hydraulics: Show the names and location of all streams in the area. Determine the high and low water stages. Note if the land is ever flooded by backwater. If there are other bridges in the vicinity, make a note of the location of the structure and the size of its opening.

10. Permanent Monuments: A diligent search should be made for all recorded survey monuments. All found evidence, both recorded and unrecorded, will be shown on the map

11. DTM: A DTM is a representation of the surface of the earth utilizing a triangulated network of points. The DTM models the surface with a series of triangular planes. Each of the vertices of an individual triangle is a field-measured 3D coordinate point. DTMs are created by measuring data points that define breaklines and random spot elevations. Cross sections, profiles, contours, and slope vectors can be developed from a DTM.

11.3.2.4 STATIONING

Stationing will run from north to south and from west to east, corresponding with the highway route number (odd is north-south and even is west-east). If the existing stationing does not follow this rule, the existing stationing direction will be followed.

Stationing will be in 100 foot increments with control points measured to 0.01 foot accuracy, i.e. 10+00.00.

When the existing alignment is in SI units (Metric), the beginning of that Metric alignment will be equated to an earlier alignment that used US customary units (English). Stationing will be recalculated from that point using English units. The radius of the Metric curve will be converted to English units to the nearest 0.01 foot and the radius will be used to define the curve.

There are different types of projects that affect how the features will be located on the construction plans. These can be shown on the construction plans as either stations or mile points as outlined below. In all cases, the construction plans will identify the right of way map number(s) used in establishing a link to the record data.

For projects that require a change in the right of way and a retracement survey has been completed, the construction alignment and stationing will be based on the retracement survey information. Further the retracement survey will be based on the alignment and stationing of the latest published right of way map in the Map Center in FileNet. It is a best practice for the construction alignment and the right of way alignment to be the same.

For projects where the construction alignment deviates from the right of way alignment, the construction alignment will begin and end the deviation on the same tangent bearing as the right of way alignment. An offset to the right of way alignment must be 2 foot or greater to avoid confusion of the two alignments. If the deviation occurs on an arc section of a curve, the local tangent of the two alignments will be the same bearing at that point. No deviation will occur on the spiral portion of the curve. The deviation will be shown on the construction plans as an equation at both ends of the construction alignment. The stationing used on the construction alignment will be significantly different from the right of way alignment stationing. In no case will the construction alignment create an angle point with the right of way alignment without prior approval from the State Traffic-Roadway Engineer.

For projects that do not require a right of way centerline retracement survey, the stations will be derived from the current published right of way center line. A disclaimer will be placed on the project plans stating that the center line is for construction purposes only and should not be used for determining existing right of way.

For very simple projects, such as resurfacing projects, mile points can be used in lieu of engineer stations to define the construction limits. The mile point must be taken from an existing data source. An appropriate source is Transviewer 'Inventory Summary' reports for current mile point data. The photo log mile points are not recognized as existing data sources for determining accurate mile points for a project. The point that is used to determine an accurate

project mile point will be equated to the engineer station from the current right of way map and shown on the construction plans. Typical locations used to equate stations and mile points are bridges, intersections, box culverts, and in very rural areas a mile point marker. Two equation points need to be shown on the plans. If the construction sheets are a part of the project special provisions, the mile point and right of way station equation will be shown with the typical sections.

Projects that use mile points in lieu of engineer stations are less accurate than a surveyed retracement of the alignment for calculating a station for any given feature but are generally close enough to cross check with existing data. In these cases, the record station would be considered the accurate station and not a calculated station from a mile point.

Stationing should be continuous. Station equations are required at intersections of lines, bearing equations, and where new lines tie into previously established lines. Secondary alignments will be differentiated from the main centerline through labeling or naming the line (i.e. "SW" 10+00.00). Stationing will not begin below 10+00.00 for any alignment.

11.3.3 PROJECT SURVEY

11.3.3.1 GENERAL

This section provides general guidance in determining the appropriate level of survey data required for project development projects. The guidelines are broken down by the following project types: maintenance projects, 1R projects, preservation projects (3R), and modernization projects (4R Reconstruction, New Construction). The project scoping team will determine the amount of survey work that will be required for individual projects.

11.3.3.2 MAINTENANCE AND 1R PROJECTS

The amount of survey work for maintenance and 1R projects can vary depending on the project. Generally maintenance projects are small and typically require only roadside inventory type of field data collection. 1R Projects require specific roadside inventory items outlined in Section 11.1.5.

11.3.3.3 PRESERVATION PROJECTS

Preservation projects that don't include work outside the existing typical section generally only need roadside inventory information collected prior to project design. During the design work phase, it may be necessary to obtain additional data such as superelevation information on curves in need of correction, or additional widening required for new guardrail flares. The amount of additional survey data will vary and is project dependent.

Preservation projects that include major shoulder widening, curve correction, intersection channelization, or other reconstruction type work, will require more initial survey work. This work will most likely include a DTM of the area.

11.3.3.4 MODERNIZATION PROJECTS

Modernization projects will almost always require a DTM, which could require a combination of extensive survey work and/or alternative mapping methodologies such as photogrammetry, LiDAR, and laser scanning. Survey work would include gathering topographic information on breaklines (edge of pavement, ditches, shoulders) and features (guardrail, barrier, poles, signs, utilities, etc.). One of the best ways to determine the limits of the survey work is for the designer to conduct a site visit with the survey crew chief.

11.4 RIGHT OF WAY

11.4.1 GENERAL

The Right of Way Section of the Technical Services Branch is responsible for the following project development functions:

1. Estimates of right of way costs and impacts for development of the project prospectus.
2. Estimates of right of way costs and impacts for different alternatives because of environmental assessments.
3. Collaboration with the Regions in developing project access lists.
4. Cost estimates for justification of proposed land service design features.
5. Acquisition of additional real property and real property rights needed to support the project design. This includes the relocation of all people and personal property displaced by the project.

11.4.2 ACQUISITION PROCESS

Of particular importance for project location and design staff is an awareness of the time requirements necessary for the acquisition of real property and real property rights. The right of way phase in project development begins after environmental document clearance with the preparation of the right of way drawings and legal descriptions of the proposed right of way takings by the Region Survey Group. When the Region Right of Way office receives the completed right of way drawings and legal descriptions, the right of way acquisition process can begin. This process includes the appraisal of property values, offers to property owners, relocation of tenants, and demolition of property improvements. The right of way acquisition phase ends when the Region Right of Way office has acquired all of the right of way and it is certified for the project bid letting.

Design decisions that are delayed until after the start of the right of way acquisition process result in revisions to legal descriptions and right of way drawings. This may result in negotiations with property owners being restarted; appraisals being redone; and/or relocation work being significantly changed. This also occurs when design parameters change after starting the right of way acquisition process.

11.4.3 TIME ALLOWANCES

The time required for the Region Survey Group to complete the right of way drawings and legal descriptions varies due to the complexity and number of properties involved. It can be as little as one week for a simple, one-file project with an exhibit map showing a temporary easement to several months for large, urban projects with dozens of multi-parcel files. The acquisition of the right of way and the relocation of displaced people and property are governed by state and federal laws. These laws guarantee all property owners certain time periods during the acquisition phase. Property owners have a minimum of about four months, from the start of the right of way acquisition process for their own property, before the State can demand possession of the right of way. Additional time is normally required for completing property appraisals and doing any required relocation studies. Because of the statutory allowances for time, as well as the complexities surrounding many properties, typical right of way acquisition projects require eight months to several years for completion. Projects cannot be constructed until the State has legal possession of the right of way and the right of way has been certified.

Design changes with minor right of way impacts will delay completion of an ongoing right of way acquisition process from one to four months. Design changes with major right of way impacts will delay the right of way acquisition process from four to seven months (or more). Contract letting dates can and do slip because of these delays. All project design decisions and work in areas having potential right of way impacts must be addressed as early as possible. Design changes after the start of the right of way acquisition process must consider the impact to the scheduled contract letting date.

11.4.4 PROPERTY RIGHTS

The State secures the property right to enter upon land to construct and maintain facilities by acquiring either fee title or various types of easements. The following describes these different property rights.

11.4.4.1 FEE TITLE

This covers all property rights with full title being conveyed to the State. The property owner retains no rights to the property being acquired. The State can acquire the entire property or just a portion of the property. The minimum widths for freeways, expressways, and major streets in urban areas are based on sound engineering judgment and local government policies. The standard margin for rural locations is 10 feet to 15 feet outside the average cut (including slope rounding, see Section 4.2.8) or fill slope to provide an adequate area to construct the project, maintain drainage facilities, locate utilities, etc. Fee title for city streets or urban highways is normally 1 foot outside the sidewalk, but may be at the outside edge of the sidewalk if it greatly reduces property expenses or impacts to buildings. The Project Team makes these decisions.

11.4.4.2 EASEMENTS

An easement is the right to use an exact piece of property for a specified need for a certain period of time. It may be necessary to acquire easements for slopes, drainage facilities, utilities, detours, irrigation facilities, riprap, road approaches, illumination facilities, signs, wetland mitigation, work areas, etc. All of the different uses must be specified and cited in the conveyance document. The State's future use of the easement area will be limited to only those uses declared in the deed. The underlying fee title to the easement area remains with the property owner. The property owner's use of the easement area is limited to only those activities that do not interfere with or affect any of the State's easement rights. Easements are never within a fee title acquisition. Easements usually adjoin property acquired as fee title. Easements not adjoining the right of way need to include a designated path for ingress and egress.

By state and federal law, fee title and easements must be valued and negotiated in exactly the same manner. The time allowances for the property owner are the same. Project Leaders and all staff working on the project should not be misled into thinking that projects requiring mostly easements rather than fee title are simpler or can be done more quickly. The exact same considerations must be observed so that sufficient time is provided for any property acquisition. The necessary location data and technical design information needs to be delivered to the Region Survey Group in a timely manner.

The following outline provides information about two categories of easements that may be needed:

A. PERMANENT EASEMENTS

This provides the permanent right to use a certain piece of property for a specified need. The deed or conveyance document will be recorded in the public records of the County and thus the easement will show as an encumbrance on a title report for the property. There are two categories of permanent easements:

1. To accommodate the transportation facility. Examples would include permanent easements for slopes, drainage facilities, riprap, illumination facilities, signs, wetland mitigation, etc.

2. To accommodate utility companies, irrigation districts, government agencies, and other commercial or private facilities. Occasionally, utility easements are purchased in the name of the appropriate utility company. The Region Utility Specialist provides information about what, when, and where utility easements are necessary.

B. TEMPORARY EASEMENTS

This provides the right to use an exact piece of property for a specified need for a limited period of time. For the State, this is almost always for an activity that is necessary only during the time

of project construction. The time period for a temporary easement is either the estimated time for project construction or the actual duration of project construction, whichever is sooner. If the project is completed ahead of the estimated schedule then the temporary easement expires at that time. If project construction exceeds the estimated schedule, then the State will need to re-negotiate with the property owner for a new temporary easement. Examples would include temporary easements for detours, work areas, road approaches, etc. If the State is acquiring only a temporary easement from a property owner, then the deed or conveyance document will not be recorded in the public records of the County.

11.4.4.3 CONDITIONAL ENTRY ONTO PRIVATE PROPERTY

A. RIGHT OF ENTRY

A Right of Entry gives the State temporary permission to enter certain private property to perform a specific task. During project development, a Right of Entry can be used to evaluate properties for potential transportation needs by performing geological tests, archeological studies, environmental studies, land surveys, etc. During project construction, a Right of Entry can be used to perform a presumed benefit to the property such as rebuilding road approaches, slopes, drainage operations, etc. It is not intended or expected that a Right of Entry will be followed by a formal right of way acquisition.

A Right of Entry is not a deed. The format may be as simple as a hand-written document with a sketch map attached. A written property description is not required; the map alone defines the area where permission is being granted. The map need not be an official survey; it can be very simple and basic. The Right of Entry only needs to clearly explain when and exactly where the State will be performing a certain task. The property owner usually receives no compensation and can revoke a Right of Entry at any time.

B. PERMIT OF ENTRY

A Permit of Entry gives the State temporary permission to enter certain private property to perform a specific task. During project construction, a Permit of Entry is used in emergency situations where access to private property is necessary. Such a permit is to be used sparingly; it is not to be used to circumvent the standard right of way acquisition process. The Permit of Entry should clearly explain when and exactly where the State will be performing a certain task. The permit should also declare the State's intention to soon enter into negotiations with the property owner. It is expected that a Permit of Entry will be followed by a formal right of way acquisition. The property owner can revoke a Permit of Entry at any time.

11.4.5 PROPERTY CONVEYANCE DOCUMENTS

The Region Survey Group develops the legal descriptions for right of way acquisition which are forwarded to the Right of Way Section in Salem to be used in the conveyance documents. The preparation of legal descriptions by the Region Survey Group and conveyance documents by the Right of Way Section ensures the proper transfer of real property and property rights. Property needed for right of way cannot be appraised and purchased until the legal descriptions are written and the right of way drawings are completed. The proposed right of way design relies on the project design and delays in receiving this information or subsequent changes to this information result in delaying the right of way acquisition process. Project Leaders must ensure that the Region Survey Group receive the necessary design information in a timely manner, as agreed to in the project schedule.

11.4.5.1 SPECIAL RIGHTS OF WAY

Separate legal descriptions and right of way drawings must be developed for parcels of land that are not part of the regular right of way, such as: stockpile sites, quarry sites, scale sites, etc. The data required for acquisition of such parcels is the same as that needed for regular right of way. All stockpile sites are to be purchased, not leased.

11.4.5.2 RAILROAD ENCROACHMENTS

A specific drawing is developed and submitted with the legal description when the State's construction needs encroach upon a railroad right of way. The explicit relationship between the centerline of the railroad track (not the centerline of railroad right of way) and the highway centerline must be shown. Due to the additional time required to develop railroad encroachment drawings, the Project Leader should work closely with the Region Survey Group to assure that the project is kept on schedule.

11.4.6 ACCESS RIGHTS

Access is a complex issue that requires careful deliberation and decisions by the Project Team. OAR 734 Division 51 form the basis for access decisions during project development. Information to be considered includes the designation of the highway, ODOT policies and rules regarding access, design standards, safety of the travelling public, and a list of the existing road approach permits and/or access control measures. There are very specific policies and regulations regarding access, which include state and federal laws, Oregon Highway Plan, and agency access management manuals. The Project Team will use this information to determine the access control measures needed on a project. The Project Leader may decide to form a sub-team to consider access management issues to be addressed as part of the project. (See Project Delivery Leadership Team Operational Notice PD-03 for more information about these sub-teams). Detailed guidance and structure for those required to make and carry out appropriate

access management decisions in the development of highway projects can be found in the Access Management Manual.

The status of highway access rights for a certain property can be as follows:

1. Access completely restricted. The State has acquired all rights of access between the highway and an abutting property. No highway access is allowed. This can cover the property's entire frontage or just a portion of the frontage. The deed or conveyance document is recorded in the public records of the County and thus the access restrictions show as an encumbrance on a title report for the property.

2. Access controlled to reserved locations. The State has acquired all rights of access between the highway and an abutting property, but provided the property owner a "reservation" of access rights at a specified location. Highway access is allowed only at the specified location. This can cover the property's entire frontage or just a portion of the frontage. The deed or conveyance document identifies the access location (reservation) by Engineer's Station and is recorded in the public records of the County. The access restrictions show as an encumbrance on a title report for the property. Prior to construction of an approach, the property owner must obtain from the State both a Permit to Construct a State Highway Approach and then a Permit to Operate, Maintain and Use a State Highway Approach.

3. Access not controlled. The State has acquired no rights of access between the highway and an abutting property. Only the State's permitting process controls the location of a highway approach. Prior to construction of an approach, the property owner must obtain from the State both a Permit to Construct a State Highway Approach and then a Permit to Operate, Maintain and Use a State Highway Approach. If an approach connects to a local street system then the property owner must also obtain a permit from the County or City.

Access rights are property rights. Where access rights are to be restricted or controlled, the Right of Way Section will use the standard acquisition process. Whether access control is acquired or not, the District Maintenance office is responsible for all approach permits. If the State is acquiring property for the project, the Region Right of Way office can obtain needed signatures from the property owners for the permits.

A Grant of Access is required to provide new or additional access rights for property that has its access rights controlled with reservations or for property that has no access rights to the highway. A grant is also required to remove a use restriction for a farm crossing or farm access on an access reservation. A Grant of Access is very difficult to justify. But if it is approved, the property owner must pay the market value for the access right, based upon a comparison of the property value with the access right versus. The Right of Way Section will order a property appraisal, prepare the conveyance document, and record the fully executed document in the public records of the County.

An Indenture of Access is required to change the location, width, or use of an existing access reservation. (Except the removal of a farm crossing or farm access restriction, which requires a

grant). Any changes must comply with current laws and policies regarding access management. The Right of Way Section will prepare the conveyance document and record the fully executed document in the public records of the County.

Some projects require the acquisition of additional access rights or changes to the existing access rights. This is usually done to eliminate or modify existing reservations of access. This can be accomplished through the standard right of way acquisition process.

Oregon law automatically restricts access rights in certain circumstances. ORS 374.405 prescribes that there is no abutter's right of access along a completely new highway alignment constructed after May 12, 1951, unless the State identifies such access rights at the time of right of way acquisition. If highway approaches are to be allowed to a new alignment, it is important to coordinate this with the Right of Way Section. The right of access will need to be declared in the conveyance document. Providing new or additional access rights to a highway alignment established after 1951 may require a Grant of Access. Consult with the Right of Way Section in such circumstances.

11.4.6.1 LOCATION OF HIGHWAY APPROACHES

On projects where highway approaches will be provided, the Access Management Subteam will establish the Official Access List. This list identifies existing approaches that will remain unchanged, existing approaches that will be rebuilt, new approaches that will be constructed as a part of the project, and existing approaches that will be removed. The list will identify the location (by Engineer's Station) and width of all highway approaches that will be allowed after completion of the project. This information may be declared in the conveyance documents for right of way acquisition. The Official Access List must be approved by the Area Manager. Any changes to the list must be approved by the Access Management Subteam Core members and the Area Manager.

Access reservations are identified in the deed or conveyance document from the property owner. All decisions must be finalized regarding the allowable location of access reservations prior to the start of the right of way acquisition process. These decisions should be based upon the State's current Access Management policies as well as any unique project conditions or needs.

If any existing legally-permitted driveways are to be closed as part of the project, the Access Management Subteam, and subsequently the Area Manager, will make that decision based on the access management strategy for the project. Oregon Administrative Rules provide for certain remedies that may be administered by the Right of Way Section. Such remedies may consider the financial cost associated with restoring access to the property, if necessary. If the closure of an approach is at an access reservation or grant of access location, it is elevated to the taking of a property right. In both situations, the Right of Way Section will set up a file and work with the property owner accordingly.

Often the right to enter upon private land to construct or reconnect a highway approach is handled during negotiations with the property owner and generally becomes part of the State's

obligations. In such cases, a temporary easement for constructing an approach is not needed. However, if the approach involves major construction such as a fill section, a temporary easement may be needed. The Right of Way Section should be consulted to determine what is necessary.

11.4.7 MISCELLANEOUS RIGHT OF WAY ISSUES

11.4.7.1 RIGHT OF WAY ESTIMATES

An accurate right of way estimate is needed to establish a workable right of way budget and to apply for Federal Highway approval to use allocated funds. The right of way estimate is based upon the market value of the real property that is needed. This involves researching the highest and best use of each property, zoning, existing use of the property, available utilities, etc.

11.4.7.2 ENCUMBRANCES AND LIENS

All encumbrances on real property that is needed for right of way need to be discovered. Encumbrances can be easements or permits to others for roadways, waterlines, power lines, etc.

Liens, such as mortgages, trust deeds and contracts, which encumber the necessary right of way must also be discovered. Such liens may need to be cleared which could delay the State's taking possession of the property.

11.4.7.3 UTILITIES

The Project Leader, with the aid of the Region Utility Specialist, shall determine the location and ownership of all existing utilities. Careful attention needs to be paid to the difference between "Utility facilities" and "Private lines." The Region Utility Specialist handles utility facility relocations while private line relocations are generally handled as a part of the right of way negotiations. Utility relocation often affects the amount of right of way needed. It is critical to identify utility needs early in the project development.

11.4.7.4 RAILROADS

The Right of Way Section's Project Administration Unit should be contacted. Whether or not the State is obligated to reimburse for railroad moves needs to be established. The Right of Way Section's Railroad Coordinator works directly with the railroad companies regarding their concerns and completes the needed paperwork.

11.4.7.5 LAND SERVICES JUSTIFICATIONS

The Right of Way Section may be asked to provide cost estimates to justify land service design options such as frontage roads, cattle or equipment passes, major installations for irrigation or for restoration of water supplies, etc. The estimated costs are a necessary component of the design option decision process when:

1. The amount of right of way plus potential damages varies greatly between design options. The cost of building a facility plus the required right of way impact for that facility should be compared to the cost of the right of way impact if the facility were not part of the design. The latter may result in larger takings and increased damages to the adjacent properties.

2. When the facility is at least partially for the public's benefit. Examples include situations when the facility would provide highway safety, access to recreation areas, fire protection, preservation or enhancement of the area economy or equitable treatment of property owners.

11.4.7.6 LIVESTOCK AND EQUIPMENT UNDERPASSES

Livestock and equipment underpasses may be provided when:

1. The full cost of the underpass structure is less than the additional right of way costs for eliminating such access.

2. The underpass structure is partially for the State's benefit by eliminating any at-grade crossings. Investigation must show a continuing benefit. This must have the approval of the State Traffic-Roadway Engineer.

11.4.7.7 SOUND WALLS

Sound walls usually prevent direct physical access to the highway right of way. Normally the right of way is delineated so that the entire sound wall (including its footing) is within the State's fee title right of way. However, the fee title line may be at the back face of the wall with a permanent easement covering any portion of the footing lying beyond that.