HIGHWAY MOBILITY OPERATIONS MANUAL

OREGON DEPARTMENT OF TRANSPORTATION

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Oregon

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To: Oregon Department of Transportation

From: Bruce A. Warner, Director

Subject: ODOT Mobility Manual

I am very pleased to introduce the new ODOT Mobility Manual, which is the result of a highly successful collaborative effort by many parts of the agency. It represents our policies and our approach to the challenges of keeping traffic and freight moving during construction and other potential impediments to mobility.

As you know, mobility has emerged as one of the most important issues facing the department. Construction volume is expected to double and the number of projects will soon exceed 750. This increase is due to our ongoing construction program; maintenance, operations, and ITS projects; incidents and events such as rockslides; and the Oregon Transportation Investment Act (OTIA), especially the OTIA III State bridge program. In addition to ODOT activities, there are many factors that affect mobility—projects by cities and counties, utility work, harvest seasons for agricultural products, even significant tourism events. As a result, we will see an unprecedented strain on the system's ability to keep traffic and freight moving during this time.

To keep the state highway system open to traffic and freight, we have instituted an "air traffic control" system to track and forecast potential mobility conflicts. To support this effort, this manual establishes ODOT's policies and procedures, roles and responsibilities and the kind of outcomes expected from us by the Legislature, stakeholders and the public. Please join me in using this manual to ensure that we keep Oregon's state highways open for travel and business as we deliver an ever-increasing volume of projects.

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CHAPTER 1 INTRODUCTION

- Background
- Summary of Mobility Roles and Responsibilities

BACKGROUND

Mobility is best defined as the ease with which people and goods move throughout their community, state, and world. Mobility is valuable because it provides access to jobs, services, and markets. Without question, transportation's most essential function is to provide mobility for people and goods.

Traditionally, the concept of mobility has included all modes of travel, encompassing the entire door-to-door trip including transfers between modes (surface, rail, air, pipeline, and marine services). The context of this manual focuses primarily on freight mobility where the primary users are freight traffic on the Oregon highway system. Even though the focus is on freight traffic, the principles contained herein will provide for greater mobility for buses, passenger cars, recreational vehicles, and other forms of transportation.

The ease with which people and goods move on Oregon's highways is being increasingly challenged by traffic congestion. Congestion on the nation's highways has increased over the past few years. Recent trends suggest that periods of recurring congestion are getting longer, particularly in urban metropolitan areas. In addition, congestion is no longer restricted to peak commuting periods and weekday travel.

Demand for freight transportation is a major contributing factor to congestion. The expected growth in truck travel is being driven by economic and population growth. The most striking growth is expected to be on rural Interstate highways, indicating the potential for congestion to spread outside of metropolitan areas. Since 1992, traffic has grown substantially on rural highways and at a faster pace than on metropolitan highways.

Construction work zones represent another obstruction to mobility. Nationally, work zones account for about 10 percent of all delays. FHWA research shows that the traveling public is demanding increased mobility, while showing less tolerance for delays, increased travel times, and inconveniences resulting from construction-related congestion.

ODOT is embarking on an historic period of road and bridge work over the next 10 years. Keeping traffic and freight moving during this time of unprecedented construction in Oregon is one of the top priorities of the Governor, Legislature, and the Director. The budget note to House Bill 2041 directed ODOT to develop a strategy that maximizes the ease of traffic and freight movement throughout the state.

ODOT Director Bruce Warner has set forth the goal for ODOT to maintain freight mobility and keep traffic moving during construction. He has noted that ODOT's customers will base their

impressions on delay times and detour effectiveness. Therefore, each ODOT region will manage for mobility in delivery of the ODOT construction program to achieve and maintain traffic mobility thresholds for both freight and passenger cars.

There are several key elements required to achieve and maintain traffic mobility thresholds for both freight and passenger cars. These key elements include effective communication, vertical clearance restrictions, horizontal clearance restrictions, weight restrictions, delay, detours, staging, permitting, and other issues.

This manual will help identify the importance of these key elements and provide guidance on how each should be addressed during the project development process.

SUMMARY OF MOBILITY ROLES AND RESPONSIBILITIES

This summary underscores the mobility roles and responsibilities related to the mobility program taking place at various levels across the organization. Detailed communication and coordination processes for the mobility program, including roles and responsibilities, are outlined in Chapter 2 (Communication & Coordination Processes) of this manual. Mobility contacts are listed in the appendices of this manual.

ODOT Statewide Traffic Mobility Manager

The ODOT Statewide Traffic Mobility Manager will ensure that mobility operations at ODOT are a proactive, forecasting effort to prevent mobility conflicts, and will have the authority to settle those conflicts which cannot be resolved at the Region level. Conflicts will inevitably occur. In that instance, the focus will be to move quickly to mitigate mobility problems wherever they may occur as rapidly as possible. The ODOT Statewide Traffic Mobility Manager will also chair the Statewide Traffic Mobility Steering Committee and the four Corridor Mobility Committees.

Statewide Traffic Mobility Steering Committee

This advisory committee will be "high-level," focusing on Program-Level mobility themes, and will be chaired by the ODOT Statewide Traffic Mobility Manager. The committee will focus on mobility program issues and ensuring unrestricted freight routes. Participants will include:

1. ODOT: Region; MCTD; Office of Project Delivery; BDU; Technical Services; Safety; and Communications;
2. Oregon Bridge Delivery Partners (OBDP); and
3. Oregon Trucking Association (OTA); Oregon Forest Products Transportation Association (OFPTA); Oregon Manufactured Housing Association (OMHA); American Automobile Association (AAA); Local Governments; and other Stakeholders.

ODOT Regions

ODOT Regions will manage mobility on their projects. Each Region Manager will appoint a Region Mobility Liaison who will be the point of contact for the Statewide Traffic Mobility Manager.

Region Mobility Liaison

The Region Mobility Liaison will chair the Region Mobility Committee and is the Region representative to the Corridor Mobility Committees. The Liaison will be the collector/holder of all project data for the Region and will:

1. Collect local government data within the Region;
2. Collect data from neighboring states (planned and ongoing projects); and
3. Collaborate with ODOT Rail Division about the viability of proposed detour routes and rail project operations that may affect mobility.

Region Mobility Committees

These committees will be the means by which the Regions focus on mobility issues, planning, design, and operations, and will be chaired by the Region Mobility Liaison. The meeting schedule will be at the minimum monthly. Participants will include:

1. Region Staff;
2. Local Agencies with projects affecting mobility, as needed;
3. OBDP's Corridor Mobility Manager(s), as needed; and
4. ODOT Statewide Traffic Mobility Manager, as needed.

Region Staff not limited to Area Managers; District Managers; Project Managers; Project Leaders; Project Planners; Project Inspectors; Maintenance Managers; and Others

Area Managers, District Managers, Project Managers, Project Leaders, Project Planners, Project Inspectors, Maintenance Managers and others will ensure their projects and/or bundles conform to the mobility guidance and policies as presented within this manual. Region Staff will implement the mobility activities for their Region Projects and will monitor the projects and maintenance activities to meet the mobility requirements.

Oregon Bridge Delivery Partners (OBDP)

OBDP will provide mobility management for the Oregon Transportation Investment Act III (OTIA III) Program and a number of ODOT Statewide Transportation Improvement Program (STIP) projects. Consistent with the "Corridors First" approach of the Program, OBDP is focusing on the mobility aspects of key freight corridors. OBDP will share information that will facilitate the coordination of the mobility management effort with other ODOT projects (OTIA I and II, STIP, maintenance, etc.) and local projects, but will not provide mobility management on these projects. The ODOT Statewide Traffic Mobility Manager is responsible to ensure this information sharing occurs. OBDP will develop and prepare Corridor-Level Transportation Management Plans (TMPs) which serve as the framework for all of the Project-Level TMPs. OBDP will prepare guidelines and evaluate Project-Level TMPs by OBDP's sub-contractors and evaluate how these fit within the needs of the corridor.

ODOT Bridge Delivery Unit (BDU)

ODOT BDU shall name a Mobility Liaison. The ODOT BDU Mobility Liaison will provide input to OBDP, direct OBDP, and ensure their projects and/or bundles conform to the mobility guidance and policies as presented within this manual. The BDU Mobility Liaison shall participate in bi-weekly Mobility Alignment meetings to include OBDP and the Statewide Traffic Mobility Manager. BDU will participate in the Statewide Traffic Mobility Steering Committee.

ODOT Motor Carrier Transportation Division (MCTD)

ODOT MCTD will name a Freight Mobility Coordinator who will act as the liaison to the motor carrier industry. Any contacts with the motor carrier industry will be directed through the MCTD Freight Mobility Coordinator. MCTD will provide information regarding motor carrier operations and will follow the mobility guidance and policies as presented within this manual. MCTD will participate in the Statewide Traffic Mobility Steering Committee and in the four Corridor Mobility Committees.

ODOT Rail Division

ODOT Rail Division shall name a Mobility Liaison who will provide data for rail projects. The Rail Mobility Liaison will collaborate with ODOT Regions and OBDP about the viability of proposed detour routes and provide information regarding rail project operations. The Rail Division will follow the mobility guidance and policies as presented within this manual and will participate in the four Corridor Mobility Committees.

Corridor Mobility Committees

These committees will be formed for each key corridor and will be chaired by the ODOT Statewide Traffic Mobility Manager. These corridors include:

- ✓ I-5 South/OR 58;
- ✓ I-5 North;
- ✓ I-84; and
- ✓ US 26/97/20.

The focus will be on Corridor-Level mobility issues and inter-regional coordination. These committees will meet monthly, or as needed. Participants will include:

1. Region Mobility Liaisons;
2. OBDP's Mobility Manager or Mobility Coordinator;
3. OBDP's Corridor Mobility Manager for that corridor;
4. MCTD Freight Mobility Coordinator;
5. ODOT Rail Mobility Liaison; and
6. Key staff from all regions traversed by the corridor.

CHAPTER 2
COMMUNICATION & COORDINATION PROCESSES

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CHAPTER 2 COMMUNICATION & COORDINATION PROCESSES

- Communication & Coordination Policy Considerations
- Notifications and Appropriate Follow-up
- Communication & Coordination During Project Development
- Communication & Coordination During Construction
- Communication & Coordination Within Regions
- Communication & Coordination Statewide
- Communication & Coordination with the General Public

COMMUNICATION & COORDINATION POLICY CONSIDERATIONS

Communications within ODOT and with industry stakeholders are critical to the success of traffic mobility on Oregon's transportation system. During the planning and design phases of a project, the project team must correctly identify the impacted stakeholders and provide for their input into processes. During construction and maintenance operations, clear lines of communication are needed to identify, notify, and resolve issues as they arise.

The Highway Division Project Delivery Leadership Team stresses the importance of involving industry stakeholders in Operational Notice PD-12:

> *"In addition, construction projects can have a negative impact on the movement of freight throughout the state if height, length, width, and/or weight restrictions are not communicated to the Motor Carrier Transportation Division (MCTD)."*
>
> *"As stewards of the public trust, it is critical that ODOT communicate with the public regarding issues that impact them directly. It is critical also that ODOT follow the letter and intent of the laws requiring public input on project plans. The more we communicate with our customers and stakeholders, the stronger our relationships become, and the more trust is built. It is in our best interest as an agency and in the interest of public stewardship that we provide accurate, up-to-date information to our customers and stakeholders. Additionally, keeping freight moving efficiently on Oregon's transportation system is good for the economy."*
>
> "PDLT Operational Notice PD-12 – Project Communication Plans" dated 09/01/02

In a memo, Director Warner further addressed the importance of engaging industry stakeholders in the project development process:

> *"The process is intended to be collaborative between ODOT and industry. Industry is to participate in initial and continuing conversations about detour alternatives and mitigation requirements. The purpose of this requirement is to enable ODOT to take advantage of industry practical knowledge and to build trust between the two parties."*
>
> "Freight Mobility – ODOT Commitments With The Freight Industry" dated 12/22/04

The ODOT Policy regarding weight restrictions on bridges stresses involving industry stakeholders to minimize impacts to freight mobility:

> *"It is the policy of the Oregon Department of Transportation to work collaboratively with and minimize the impact, where possible, to the motor carrier industry and local government when it becomes necessary to restrict the allowable load over a bridge on the state highway system to maintain safe travel."*
>
> "PMT 06-01 – Weight Restrictions on Bridges Policy" dated 08/07/03

These policies are consistent with an agency-wide commitment to engage industry stakeholders with effective communication in all of ODOT's maintenance, construction, and engineering activities.

NOTIFICATIONS AND APPROPRIATE FOLLOW-UP

The Motor Carrier Transportation Division (MCTD) is the primary contact to engage industry stakeholders for all of ODOT's maintenance, construction, and engineering activities. The MCTD Freight Mobility Coordinator needs to be involved in all communications with industry stakeholders. When contacting local industry stakeholders, the MCTD Freight Mobility Coordinator must be included. Local contact with the trucking industry absent MCTD involvement does not satisfy the project communication requirements addressed in this manual. The audience of potentially impacted freight stakeholders extends well beyond known familiar local users of the road system. MCTD tracks and relays information to all industry stakeholders within the United States and Canada that are authorized to use Oregon's state highway system. The MCTD Freight Mobility Coordinator can also set up meetings with industry representatives when needed.

During project development, the MCTD Freight Mobility Coordinator should be notified in writing about any planned restriction that will affect the ability to move freight through the project work zone. When considering detour alternatives, the MCTD Freight Mobility Coordinator must be notified so they can engage key industry stakeholders in the project development process. For projects with severe impacts, the MCTD Freight Mobility Coordinator may contact industry representatives to include on the project team to assist in the project development process, including the identification and selection of possible detour routes.

During construction, whenever a project restricts the width, length, height, or weight of trucks within a work zone, ODOT has committed to provide notification to industry stakeholders through the MCTD Freight Mobility Coordinator. Written notification (form #734-2357) to the MCTD Freight Mobility Coordinator must take place twenty-eight days prior to the planned restriction, so that MCTD can contact all affected users at least twenty-one days before the restriction takes effect. This form specifies the nature of the restriction, the location of the restriction, the date the restriction begins, and the estimated date that the restriction will be lifted. It is very important to not begin restricting traffic prior to the start date submitted on the form since industry will typically plan extra shipments before the restriction goes into effect. If the contractor is delayed and will not begin restricting traffic on the start date submitted on the form, then the MCTD Freight Mobility Coordinator should be informed of the revised starting date.

Notification needs to be sent to the MCTD Freight Mobility Coordinator as soon as the restriction is lifted so that MCTD can relay this information to all affected parties as soon as possible.

Whenever a bridge load posting is deemed necessary, the State Bridge Engineer must immediately notify the ODOT District Manager, MCTD Administrator, ODOT Communications Division, and the Office of the Director. The State Bridge Engineer provides information on severity of the bridge condition and the timeframe for condition posting, taking into account the time to prepare and implement detours without compromising the integrity of the bridge. The MCTD Administrator will then evaluate the impacts of the detour and notify all appropriate industry stakeholders of the restriction.

COMMUNICATION & COORDINATION DURING PROJECT DEVELOPMENT

Starting at the scoping phase of a project, mobility and freight traffic issues must be considered. At the very beginning of the project development process, possible impacts to freight traffic must be identified and considered when a project is programmed.

The MCTD Freight Mobility Coordinator should be initially notified of all projects with potential freight impacts at the start of project development. The MCTD Freight Mobility Coordinator will help identify the key industry stakeholders that will need to be notified and involved with the project development process. The MCTD Freight Mobility Coordinator will also act as the primary liaison between the project development team and the industry stakeholders from the inception to the conclusion of the project. However, the project manager remains accountable for adhering to project stakeholder communication requirements throughout the life of the project.

The MCTD Freight Mobility Coordinator and industry stakeholders are to participate in initial and continuing conversations about detour alternatives and mitigation requirements so that project teams can take advantage of their practical knowledge and build trust between the parties. In some cases, there may be temporary freight detours available that have been used previously that the designer does not know about. Industry representatives and MCTD personnel are familiar with the strengths and limitations of most alternative routes and can provide insight on detour alternatives and mitigation requirements that may be required to upgrade a detour route so that it can handle freight traffic.

The MCTD Freight Mobility Coordinator should be involved before the approved design milestone on all projects with potential freight impacts. The “Project Information Paper” including key milestones and notification of public meetings should be sent to the MCTD Freight Mobility Coordinator for distribution among industry stakeholders. MCTD will be directly responsible for setting up and coordinating meetings with the freight community to resolve any width, length, height, and/or weight restrictions within work zones. MCTD will also ensure that all affected industry stakeholders are notified concerning work zone restrictions, alternative routes, or periods of normal operations within work zones.

COMMUNICATION & COORDINATION DURING CONSTRUCTION

Once a project has gone to construction, any proposed changes to the traffic control plan that may affect proposed restrictions must be communicated to the MCTD Freight Mobility Coordinator. MCTD will evaluate the impacts to freight mobility and provide guidance to the Project Manager as well as notification to industry stakeholders if appropriate.

During construction, the Project Manager is responsible to notify the MCTD Freight Mobility Coordinator in writing using form #734-2357, twenty-eight days prior to any planned work zone restriction. This notification to the MCTD Freight Mobility Coordinator is needed whenever a construction project restricts the width, length, height, or weight of trucks within a work zone. MCTD involvement in the Project Development does not preclude the requirement for written notification twenty-eight days prior to the beginning of a restriction. The MCTD Freight Mobility Coordinator is then responsible to contact all affected users at least twenty-one days before the restriction takes effect. The Project Manager is responsible for notifying the MCTD Freight Mobility Coordinator of any delays to the start date or to the duration of the restriction once the initial notification has been sent. The Project Manager is also responsible for notifying the MCTD Freight Mobility Coordinator in writing as soon as the restriction is lifted, so that this information can be relayed to all affected parties as soon as possible.

COMMUNICATION & COORDINATION WITHIN REGIONS

Each Region has a Region Mobility Liaison who will be the point of contact for the Region Manager, Statewide Mobility Manager, and the Oregon Bridge Delivery Partners (OBDP) Mobility Manager for mobility issues occurring in the region. The Region Mobility Liaison is the primary resource for managers in the Region to assist them in meeting the mobility goals.

The Region Mobility Liaison serves as the Traffic Mobility Coordinator for projects within the Region. Mobility coordination will include:

a) Collecting the schedule and duration of OTIA, STIP, local agency, maintenance, utility, and other projects in the Region;

b) Chairing the Region Mobility Committee;

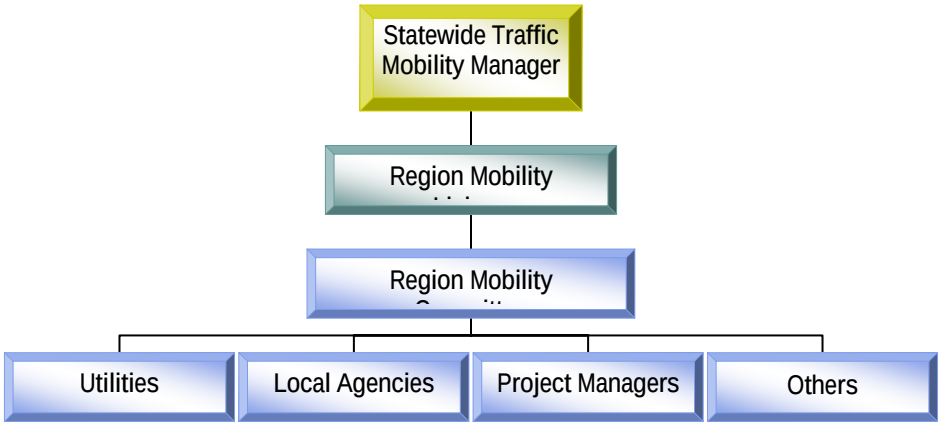
c) Identifying where conflicts or combinations of projects within the schedule will affect region mobility or corridor mobility and developing a process for the appropriate staff to remedy those conflicts; and

d) Working as a resource and partner with the OBDP Corridor Mobility Managers, OBDP Mobility Coordinator, ODOT Statewide Traffic Mobility Manager, local governments, and other organizations to reduce or eliminate these conflicts.

The Region Mobility Liaison leads the Region Mobility Team and region efforts in the review and update of the Corridor-Level Traffic Management Plans (TMPs) and the Project-Level Traffic Management Plans (TMPs). They will also provide input to the Statewide Traffic

Mobility Manager and OBDP Mobility Management for process improvement throughout duration of mission.

The Region Mobility Liaison will monitor Region mobility data and activities and will collect all project data for the Region to include any restrictions such as height, width, weight, estimated travel delay, lane closures, proposed detour routes, etc. They will also collect local government project data within the Region to acquire their planned construction and maintenance activities to forecast whether a potential conflict exists with planned Region construction activities. The Region Mobility Liaison will also collect data on planned restrictions from neighboring states (planned and transpiring projects) adjacent to the Region that could conceivably impact freight. The liaison will track special events within the Region that could cause increased traffic volumes or delays, such as major sports or entertainment events, major agricultural trucking activities, or local community events.



COMMUNICATION & COORDINATION STATEWIDE

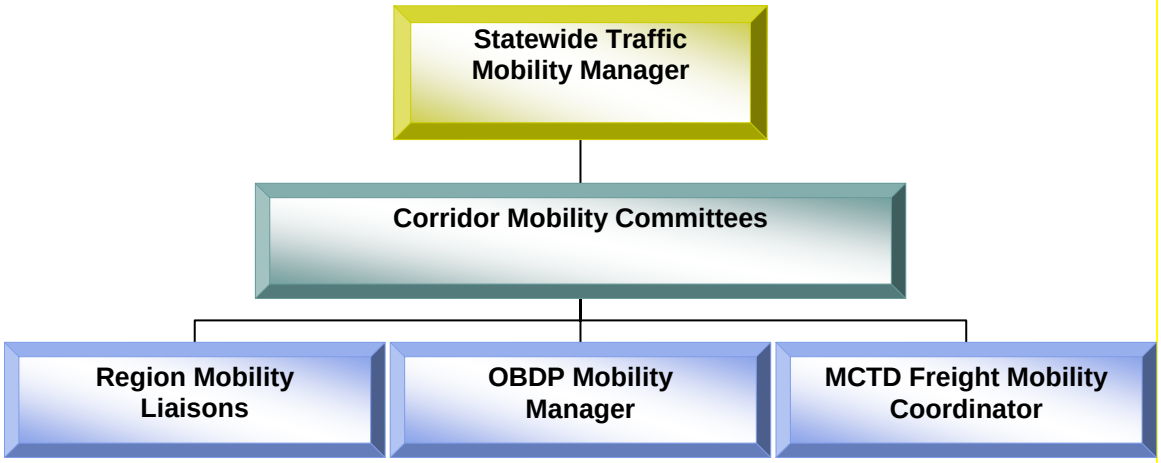
The Region Mobility Liaisons will forward all data collected to the ODOT Statewide Traffic Mobility Manager who will then work with the Steering Committee to forecast, prioritize, and coordinate projects while resolving conflicts in the application of ODOT mobility standards statewide. They will also forward all data to the OBDP Mobility Manager who will then work with the OBDP Corridor Managers to apply mobility requirements and coordinate OBDP program corridor-level conflicts.

The Region Mobility Liaisons will ensure inter-regional mobility through participation on Corridor Mobility Committees. Decisions about projects in one region may have consequences for projects on the other side of the state, and those competing interests will have to be balanced. Therefore, corridor-level mobility coordination will occur through corridor mobility committees that focus on corridor-level mobility, inter-regional coordination, and the goal of resolving potential mobility conflicts at the lowest possible level.

Corridor Mobility Committees (four committees to include: *I-5 South/OR58, I-5 North, I-84, and US 97/26/20*) will be chaired by the Statewide Traffic Mobility Manager and will include representation from Region Mobility Liaisons, OBDP Corridor Mobility Manager, OBDP Mobility Manager, and the OBDP Mobility Coordinator. These committees will meet to resolve corridor-level mobility issues and provide inter-regional coordination. The committees will include collaboration with ODOT Rail Division about viability of proposed detour routes.

The Oregon Bridge Delivery Partners will provide mobility management for the OTIA III State Bridge Program and a number of ODOT STIP projects for the duration of the OTIA III Program. OBDP will exchange information that will facilitate the coordination of the mobility management effort with other ODOT projects (OTIA I and II, STIP, Maintenance, etc.) and local agency projects, but will not provide mobility management on these projects. The ODOT Statewide Traffic Mobility Manager is responsible to ensure that this information sharing occurs.

The Statewide Traffic Mobility Manager will ensure that mobility operations at ODOT are a proactive, forecasting effort to prevent conflicts. The Statewide Traffic Mobility Manager will also have the authority to decide those conflicts which cannot be resolved at the Region level. When conflicts occur, the focus will be to move quickly to mitigate mobility problems wherever they occur as rapidly as possible.



COMMUNICATION & COORDINATION WITH THE GENERAL PUBLIC

ODOT will inform the public about the new approach to mobility management so the public will know we are fulfilling ODOT's mission to keep Oregon moving. The Communications Division will use a variety of tools and tactics to let taxpayers know we are coordinating efforts to minimize expense and inconvenience for travelers and haulers.

Regarding day-to-day information about traffic delays, the goal is to make communication seamless for the average motorist. The public will continue receiving traffic mobility information through established channels: TripCheck.com, 511, weekly construction reports from regions, and the news media. ODOT may provide new types of information regarding corridor delays through existing channels, but development of new communication channels are not necessary.

Project teams will continue developing and implementing project communication plans but flexibility will be important. Corridor management means that delays on one project may impact the level and type of communication needed on another project miles away.

Hypothetical Example: The communication plan for a project in the Portland area calls for a moderate amount of communication to the public because the project is not expected to have a major impact on traffic. However, cumulative delays from other projects on the same corridor are making this project more critical to managing the corridor delay threshold. If motorists could be encouraged to avoid the Portland-area project, the delay will be reduced and corridor goals met. Therefore, it is decided that the public should receive more information in a higher-profile format for the Portland-area project than originally scheduled.

COMMUNICATION & COORDINATION CASE STUDY: MILL CREEK BRIDGE PROJECT

The Mill Creek Bridge Project, along the Warm Springs Highway (US 26) in Wasco County, provides a good case study for successful communications and coordination to reduce impacts to mobility and freight traffic. For this project, ODOT had a bridge deck failure on a historic steel truss structure, which also happened to be one of the highest bridges in Oregon. The project, located on the Warm Springs Indian Reservation, was surrounded by sensitive archaeological sites, cultural sites, and endangered species. The only detour route available to trucks would take them a great distance off of their route and cause extensive delays. Further complicating the matter, this particular route is a primary freight route carrying around 5,000 vehicles per day, including a significant truck percentage (15%).

At the beginning of the project development process, the project team identified impacts the project would have on freight mobility and the need to involve industry stakeholders. The MCTD Freight Mobility Coordinator was included on the project development team. The MCTD Freight Mobility Coordinator sent communications out to industry stakeholders and invited two key industry representatives to meet with the project team due to the severity of the potential impacts to their operations.

By meeting with the MCTD Freight Mobility Coordinator and representatives from the freight industry, an alternative construction method was identified that had been successfully used in other states. By analyzing the shipping schedules for freight along this route, along with the traffic patterns for regular vehicles, a closure schedule was agreed upon which minimized impacts to the freight industry as well as the traveling public. The roadway closed for four days each week starting on Sunday night, sections of the deck were replaced with new precast sections, and the route was reopened to traffic each Friday morning without any restrictions. The MCTD Freight Mobility Coordinator and the industry representatives communicated the

restrictions to industry stakeholders so they could schedule their trips to coincide with the route's open times.

By working closely with MCTD and industry stakeholders, a method was selected that accelerated construction and had minimal impacts to freight mobility and the traveling public. Through the communications process, work was scheduled to avoid days of heavy freight traffic, and others were able to plan their trips around the work schedule. Through effective communication and careful planning, the project was constructed in a shorter time and mobility impacts were minimized.

CHAPTER 3
VERTICAL CLEARANCE

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CHAPTER 3 VERTICAL CLEARANCE

- Vertical Clearance Policy Considerations
- Vertical Clearance Design Standards
- Improving Vertical Clearance
- Temporary Vertical Clearance Restrictions
- Vertical Clearance Case Study

VERTICAL CLEARANCE POLICY CONSIDERATIONS

Maintaining an appropriate vertical clearance is instrumental to successfully transporting freight within the State of Oregon. The movement of mobile homes, construction materials, construction equipment, and many other types of freight critical to Oregon's economy are greatly restricted due to insufficient vertical clearance on many routes. Vertical clearance on some of Oregon's key freight corridors has slowly eroded as preservation efforts have added additional layers of asphalt under structures.

In a memo, Director Warner addressed the importance of establishing and maintaining vertical clearance on routes:

> *"ODOT will NOT reduce existing Vertical Height Clearance on the interstate 'except when it absolutely cannot be avoided.' The Highway Division has adopted a new policy on this issue, but it needs further refinement and clarity. It is understood that such an exception to this requirement would be rare. We agreed that maintaining at least 17 feet of clearance in our structures is critical to the movement of large loads throughout the state. We further agreed that we would design our new structures to plan for future overlays so that our 17 foot level would not be compromised in the future."*
>
> "Freight Mobility – ODOT Commitments With The Freight Industry" dated 12/22/04

The commitment by ODOT to maintain and improve the vertical clearance on the system will not be an easy task, but once completed, will provide significant benefits to the health of Oregon's economy.

ODOT's current vertical clearance design standard states,

> *"The vertical clearance on all new urban and rural freeway structures shall be a minimum of 17 feet. The clearance shall be from the top of the pavement to the bottom of the structure and includes the entire roadway width including the usable shoulder width."*
>
> ODOT Highway Design Manual, page 6-5

In order to meet the expectations established in Director Warner's memo, ODOT's new design standard for vertical clearance will need to be at least 17 feet, 6 inches. This will provide 16 feet, 6 inches of vertical height clearance for vehicles, a six inch buffer between the top of the vehicle and the bottom of the structure, and a six inch buffer for future overlays.

VERTICAL CLEARANCE DESIGN STANDARDS

The vertical clearance for all new structures on interstate freeways shall be a minimum of 17 feet, 6 inches. The clearance shall be from the top of the pavement to the bottom of the structure and includes the entire roadway width including the usable shoulder width.

The vertical clearance of structures on interstate freeways shall not be degraded to less than 17 feet, over the entire roadway width including usable shoulders. Existing clearances on interstate freeways of less than 17 feet, but greater than 16 feet, 8 inches, shall not be degraded. The vertical clearance on interstate freeways shall not be less than 16 feet, 8 inches.

The vertical clearance for new structures on all other routes on the National Highway System shall be a minimum of 17 feet. The clearance shall be from the top of the pavement to the bottom of the structure and includes the entire roadway width including the usable shoulder width.

The vertical clearance of structures on all other routes on the National Highway System shall not be degraded to less than 17 feet, over the entire roadway width including usable shoulders. Existing clearances on all other routes on the National Highway System of less than 17 feet, but greater than 16 feet, shall not be degraded. The vertical clearance on all other routes on the National Highway System shall not be less than 16 feet.

During construction, the MCTD Freight Mobility Coordinator shall be notified a minimum of twenty-eight days before temporarily reducing the vertical clearance on any structure.

Improving Vertical Clearance

Improving vertical clearance on freight routes and throughout the system is essential to the economic health of the State. Oregon's existing transportation system is struggling to provide viable freight routes due to vertical clearance pinch points. Even primary freight routes, which utilize freeway corridors, are crippled with numerous obstacles requiring localized detours. In order to improve freight mobility, ODOT will need to identify and eliminate existing problems using the following process:

1. Update inventory of all structures over each route;
2. Identify all structures with substandard vertical clearance on each route;
3. Prioritize all problem areas from most restrictive to least restrictive; and
4. Establish and implement improvement strategies to increase vertical clearance along each route.

This process should be used to systematically remove pinch points and problem areas to clear each freight routes. As the most restrictive structures are addressed, the overall vertical clearance for the corridor will improve and freight mobility will increase.
Any construction project directly involving one of the structures identified as having substandard vertical clearance would need to be evaluated for opportunities to increase the vertical clearance.

This could be accomplished through replacing the structure, raising the structure, or reconstructing the roadway under the structure to lower the grade. Structures that are no longer in use, such as abandoned railroad structures, should be removed whenever possible. Overlays under structures with substandard vertical clearance shall not be allowed.

In some rare cases, the cost of increasing the vertical clearance will be very high with little or no benefit to freight traffic using the route. This may occur when there are several unrestricted routes in close proximity to the route in question. In these cases MCTD will contact industry representatives and will perform an informal cost-benefit assessment to determine whether or not the load routing will be impaired if the vertical clearance for a substandard structure is not addressed. If MCTD determines that the load routing will not be impaired and the industry representatives concur, then the project can be reviewed for a design exception. (An example of an actual cost-benefit assessment that resulted in a design exception request is located in Appendix F).

TEMPORARY VERTICAL CLEARANCE RESTRICTIONS

Temporary vertical clearance restrictions can have severe impacts on freight mobility, and if not planned properly can choke off entire routes. Several factors must be considered before imposing temporary vertical clearance restrictions on a route. These include but are not limited to the following:

1. Are there any available options that would eliminate the restriction?
2. Are there any available options that would minimize the restriction?
3. Are there any available options that would shorten the duration of the restriction?
4. How will restricted traffic be detoured?
5. Are there any restrictions on the detour route?
6. Is this route being used as a detour for other restricted routes?
7. How will all restricted vehicle owners be notified of the restriction?
8. How will the restrictions affect existing MCTD permits?
9. How will the restrictions affect emergency services?

If restrictions would limit or delay the passage of emergency services vehicles, then special coordination with these stakeholders must be made. If there is a conflict with other projects, then the work should be rescheduled to eliminate the conflict. A back-up detour route should always be identified in case of a natural disaster or unplanned restriction on the proposed detour route.

When planning a temporary vertical clearance restriction, the MCTD Freight Mobility Coordinator and industry representatives must be engaged in the decision making process. The MCTD Freight Mobility Coordinator has information about how many and what types of vehicles use each route. They also have experience setting up detours and providing appropriate notification to all affected vehicle owners. Industry representatives have a great deal of experience dealing with restrictions and in finding ways to avoid or minimize the restrictions.

In some cases the cost of maintaining the vertical clearance during construction will be very high when the impacts of a temporary restriction to freight traffic using the route will be relatively

small. This may occur when the duration of the project is very short or if there are several unrestricted routes in close proximity to the route in question. In these cases, MCTD will contact industry representatives and meet with them to evaluate the different alternatives. MCTD will perform an informal cost-benefit review of strict adherence to the vertical height clearance standard and provide the results to the affected industry representatives for concurrence.

During construction, adequate signing and traffic control devices must be employed to warn traffic and direct affected traffic around the restriction. False-work illumination and over-height vehicle warning systems can also be used, if needed. Written notification must be sent to the MCTD Freight Mobility Coordinator at least twenty-eight (28) days before any restriction can be implemented.

VERTICAL CLEARANCE CASE STUDY: LANCASTER DRIVE BRIDGE PROJECT

The Lancaster Drive Bridge portion of the OR 22: North Santiam Highway Bridge Repairs Project, along the North Santiam Highway in Marion County, provides a good case study for temporary vertical clearance impacts to freight mobility. For this project, ODOT had a failing concrete structure that crossed over a high volume roadway. Further complicating the matter, this particular route already had a vertical height restriction.

In order to strengthen and repair this structure, it was determined that steel plating would be needed to provide the required structural reinforcement. Steel plates on the top of the deck would be bolted to other plates on the bottom of the deck to provide the needed structural support. Unfortunately, the existing vertical clearance of the structure was already only 15’ 3”. By bolting steel plating to the bottom of the structure, the project would be reducing the vertical clearance by an additional 2” – 2½”.

To determine the impacts of further reducing the vertical clearance on this structure, the MCTD Freight Mobility Coordinator and freight industry stakeholders were contacted. Due to the severity of the impacts to freight mobility along this freight route, additional options to reinforce the bridge without reducing the vertical clearance were researched. After much hard work, the bridge designer found a way to provide the needed structural reinforcement without reducing the portal height for the structure. The needed repairs were made without restricting freight mobility.

CHAPTER 4
HORIZONTAL CLEARANCE

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CHAPTER 4 HORIZONTAL CLEARANCE

- Horizontal Clearance Policy Considerations
- Horizontal Clearance Design Standards
- Improving Horizontal Clearance
- Temporary Horizontal Clearance Restrictions
- Horizontal Clearance Case Study

HORIZONTAL CLEARANCE POLICY CONSIDERATIONS

Maintaining sufficient horizontal clearance throughout Oregon's transportation system is one of the keys to successfully moving freight within the State. The movement of mobile homes, construction materials, construction equipment, and many other types of freight critical to the economy can be greatly affected by insufficient horizontal clearance. The commitment by ODOT to maintain and improve the horizontal clearance on the system will provide significant benefits to the health of Oregon's economy.

ODOT's current horizontal clearance design standard for traffic operation during construction states,

> *"The plan should provide for a minimum width…for two-way traffic and…for one-way traffic, exclusive of traffic control devices. Acceptable widths less than these must be approved by the State Traffic Control Plan Engineer. Special consideration for wider clearances should be given when alternate routes for overwidth vehicles are not available or convenient."*
>
> ODOT Highway Design Manual, page 5-36

Overwidth loads up to 16 feet are commonly transported throughout Oregon. In addition, in 1997, Oregon began to allow the transport of manufactured homes with a width of 16 feet. Horizontal clearance standards required to accommodate a vehicle width of 16 feet are directly related to the horizontal curvature of the roadway. The standard crossover for traffic control during construction is limited to a 2 degree curve (2865'/875 m radius). Horizontal radius of the freeway system is limited to 3.25-degree curve (1765'/540 m radius) for flat and rolling terrain, and 5-degree curve (1145'/350 m radius) for mountainous terrain. Based on these considerations, and including appropriate shy distance, the new horizontal clearance standard should be at least 19 feet between positive barriers.

HORIZONTAL CLEARANCE DESIGN STANDARDS

The horizontal clearance of all interstate freeways shall be a minimum of 28 feet for two lanes of one-way traffic, and 19 feet for one lane of traffic, exclusive of traffic control devices. The horizontal clearance of structures on all interstate freeways shall not be reduced to less than 19 feet, unless approved by the State Traffic Control Plan Engineer. During construction, the MCTD Freight Mobility Coordinator shall be notified a minimum of twenty-eight days before temporarily reducing the horizontal clearance to less than 22 feet for one lane of traffic between positive barriers or less than 28 feet for two lanes of one-way traffic between positive barriers.

The horizontal clearance on all other routes on the National Highway System shall be a minimum of 28 feet for two-way traffic, and 16 feet for one-way traffic, exclusive of traffic control devices. The horizontal clearance of structures on all other routes on the National Highway System shall not be reduced to less than 16 feet, unless approved by the State Traffic Control Plan Engineer. During construction, the MCTD Freight Mobility Coordinator shall be notified a minimum of twenty-eight days before temporarily reducing the horizontal clearance to less than 22 feet for one lane of traffic between positive barriers or less than 28 feet for two-way traffic between positive barriers.

IMPROVING HORIZONTAL CLEARANCE

Improving horizontal clearance on freight routes and throughout the system is essential to the economic health of the State. Oregon's existing transportation system provides adequate horizontal clearance in most areas with only a few minor exceptions, but temporary restrictions can have severe impacts and can quickly cripple freight mobility. In order to protect and improve current freight mobility, ODOT will need to identify and eliminate existing problems using the following process:

1. Update inventory of all horizontal choke points;
2. Identify all areas of substandard horizontal clearance on each route;
3. Prioritize all problem areas from most restrictive to least restrictive; and
4. Establish and implement improvement strategies to increase horizontal clearance along each route.

This process can be used to systematically remove choke points and problem areas to clear each freight route. As the most restrictive areas are addressed, the overall horizontal clearance for the corridor will improve and freight mobility will increase.

TEMPORARY HORIZONTAL CLEARANCE RESTRICTIONS

Temporary horizontal clearance restrictions can have severe impacts on freight mobility, and if not planned properly can choke off entire routes. Several factors must be considered before imposing temporary horizontal clearance restrictions on a route. These include but are not limited to the following:

1. Are there any available options that would eliminate the restriction?
2. Are there any available options that would minimize the restriction?

3. Are there any available options that would shorten the duration of the restriction?
4. How will restricted traffic be detoured?
5. Are there any restrictions on the detour route?
6. Is this route being used as a detour for other restricted routes?
7. How will all restricted vehicle owners be notified of the restriction?
8. How will the restrictions affect existing MCTD permits?
9. How will the restrictions affect emergency services?

If restrictions would limit or delay the passage of emergency services vehicles, then special coordination with these stakeholders must be made. If there is a conflict with other projects, then the work should be rescheduled to eliminate the conflict. A back-up detour route should always be identified in case of a natural disaster or unplanned restriction on the proposed detour route.

When planning a temporary horizontal clearance restriction, the MCTD Freight Mobility Coordinator and industry representatives must be engaged in advance of the decision making process. The MCTD Freight Mobility Coordinator has information about how many and what types of vehicles use each route. MCTD staff also have experience setting up detours and providing appropriate notification to all affected vehicle owners. Industry representatives have a great deal of experience dealing with restrictions and finding ways to avoid or minimize the restrictions.

In some cases, the cost of maintaining the horizontal clearance during construction will be very high when the impacts of a temporary restriction to freight traffic using the route will be relatively small. This may occur when the duration of the project is very short or if there are several unrestricted routes in close proximity to the route in question. In these cases, MCTD will contact industry representatives and meet with them to evaluate the different alternatives. MCTD will perform an informal cost-benefit assessment and provide the results to the affected industry representatives for concurrence. (An example of an actual cost-benefit assessment that resulted in a design exception request is located in Appendix F).

During construction, adequate signing and traffic control devices must be employed to warn traffic and direct affected traffic around the restriction. Temporary Speed Zone Reductions and Linear Delineation Systems on barrier or guardrail can also be used, if needed. Written notification must be sent to the MCTD Freight Mobility Coordinator at least twenty-eight days before any restriction can be implemented.

HORIZONTAL CLEARANCE CASE STUDY: SIUSLAW RIVER BRIDGE PROJECT

The Siuslaw River Bridge Project, along the Oregon Coast Highway in Lane County, provides a good case study for temporary horizontal clearance impacts to freight mobility. For this project, ODOT had a failing metal grid deck on an old double bascule draw span of an historic structure designed by Conde B. McCulloch. Built in 1936, the bridge only provided 27 feet of usable roadway width. Further complicating the matter, this particular structure is the only crossing of the river for many miles and carries around 12,200 vehicles per day, including many trucks and recreational vehicles.

Due to the high traffic volumes involved and the importance of keeping this route open to traffic, the project team decided that staged construction would work better than a full closure with detour. Due to the length and nature of this structure, it was impractical to build a detour structure or widen the existing structure during construction. In order to stage the deck replacement, this project would need to further restrict a bridge that was already very narrow.

To determine the impacts of further reducing the horizontal clearance on this structure, the MCTD Freight Mobility Coordinator and freight industry stakeholders were contacted. Due to the severity of the impacts to traffic and freight mobility along this route, research was completed to develop additional options to minimize or eliminate the impacts of the horizontal clearance restriction.

Since impacts could not be avoided, efforts were made to accelerate construction and minimize the duration of the impacts. Specific construction timeframes were identified and aggressive construction windows were set to minimize the construction duration. A few days were also provided between stages for full, unrestricted traffic and freight flow to lessen the severity of the restriction. Communication protocols were established, so that industry stakeholders could prepare for these openings and maximize each day the bridge was unrestricted to the fullest advantage. Although the restriction could not be avoided, through effective communication and careful planning, the impacts to freight mobility were minimized.

CHAPTER 5
WEIGHT RESTRICTIONS

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CHAPTER 5 WEIGHT RESTRICTIONS

- Weight Restriction Policy Considerations
- Weight Restriction Design Standards
- Eliminating Existing Weight Restriction
- Temporary Weight Restrictions
- Weight Restriction Case Study

WEIGHT RESTRICTION POLICY CONSIDERATIONS

Eliminating weight restrictions on Oregon's transportation system is very important to increasing freight mobility within the State. The movement of heavy loads such as bridge girders, construction equipment, and other special types of freight is critical to Oregon's economy. These loads are greatly restricted due to the problems ODOT is having with cracked bridges. Weight restrictions on many key freight corridors has limited freight movement and placed more stress on the routes that are open.

ODOT's current policy regarding weight restrictions on bridges is as follows:

> *"It is the policy of the Oregon Department of Transportation to work collaboratively with and minimize the impact, where possible, to the motor carrier industry and local government when it becomes necessary to restrict the allowable load over a bridge on the state highway system to maintain safe travel."*
>
> "PMT 06-01 – Weight Restrictions on Bridges Policy" dated 08/07/03

In a letter to several key representatives of the freight industry, Director Warner stressed a commitment by ODOT to involve industry stakeholders whenever a bridge will be closed or posted with a reduced load rating:

> *"The third issue you raised dealt with the effective communications between ODOT and industry and local communities when a bridge was to be closed or posted with a reduced load rating. I'm sure that you recall the circumstances that led to the development and adoption of the OTC policy for effectively dealing with unanticipated bridge load restrictions and/or bridge closures. That process includes the specific provision for an open and collaborative process with the trucking industry to consider and conclude such details as the types of trucks to be detoured, the detour route(s), starting date of closure/load restriction, maximum duration of detour, signing plan, special requirements, etc…"*
>
> *"To address this issue I am instructing ODOT staff that the value of good communication applies equally to emergency closures and/or restrictions of bridges as well as to closures resulting from planned STIP projects. Therefore it will be my expectation that the OTC approved bridge closure communication plan protocol will apply equally to both circumstances."*
>
> Memo "RE: Dinner Meeting March 14, 2002" dated 03/26/02

These commitments to engage industry stakeholders when a bridge will be closed or posted with a reduced load rating will enable ODOT to take advantage of industry practical knowledge to simplify and improve processes.

WEIGHT RESTRICTION DESIGN STANDARDS

The *Guide Manual for Condition Evaluation and Load and Resistance Factor Rating (LRFR),* published by the American Association of State Highway and Transportation Officials (AASHTO), is used to determine load rating factors. Whenever load rating factors show insufficient load capacity for unrestricted use by Permit Vehicles, ODOT's "Weight Restrictions on Bridges" Policy (PMT 06-01) will be followed. This includes the assembly of a Response Team including the Area Manager, the motor carrier industry, engineering staff, and local government representatives.

ELIMINATING EXISTING WEIGHT RESTRICTION

Eliminating existing weight restrictions on freight routes and throughout the system is essential to the economy of Oregon. Several structures on the existing transportation system are reaching the end of their design life. With the recent problem of concrete shear cracking complicating this problem, many primary freight routes have been affected by load restricted bridges. In order to improve freight mobility, ODOT will need to identify and eliminate existing problems using the following process:

1. Update inventory of all structures over each route;
2. Identify all structures with weight restrictions on each route;
3. Prioritize key routes which need to be cleared of load restricted bridges; and
4. Establish and implement improvement strategies to eliminate weight restrictions along each route.

This process should be used to systematically clear and reopen routes to heavy freight. As routes are reopened and more route options are created, the stress on individual routes will diminish and freight mobility will improve throughout the entire system.

TEMPORARY WEIGHT RESTRICTIONS

Temporary weight restrictions during construction can have serious impacts on a system that is already restricted. Several factors must be carefully considered before imposing temporary weight restrictions on a route. These include, but are not limited to, the following:

1. Are there any available options that would eliminate the restriction?
2. Are there any available options that would minimize the restriction?
3. Are there any available options that would shorten the duration of the restriction?
4. How will restricted traffic be detoured?
5. How will the restrictions affect emergency services?
6. Is this route being used as a detour for other restricted routes?

7. Are there any restrictions on the detour route?
8. How will all restricted vehicle owners be notified of the restriction?
9. How will the restrictions affect existing MCTD permits?

If restrictions would limit or delay the passage of emergency services vehicles, then special coordination with these stakeholders must be made. If there is a conflict with other projects, then the work should be rescheduled to eliminate the conflict. A back-up detour route should always be identified in case of a natural disaster or unplanned restriction on the proposed detour route. When planning a temporary weight restriction, the MCTD Freight Mobility Coordinator and industry representatives must be engaged in the decision making process. All of the requirements specified in ODOT's "Weight Restrictions on Bridges" Policy (PMT 06-01) must be followed before a restriction can take place.

During construction, adequate signing and traffic control devices must be employed to warn traffic and direct affected traffic around the restriction. Flaggers and/or law enforcement officers may need to be employed to ensure detour compliance in rare circumstances.

Temporary weight restrictions can also be caused by catastrophic events such as natural disasters or vehicle collisions. In these cases, MCTD and the motor carrier industry will be notified and the bridge will be restricted until the extent of the damage is determined. Once the extent of the damage has been determined, either the temporary restriction will be lifted or a permanent restriction will be put into effect until repairs can be made. Every effort will be made to ensure that the time of the temporary restriction and the effect on the motor carrier industry are minimized.

WEIGHT RESTRICTION CASE STUDY: CORDON ROAD BRIDGE PROJECT

The Cordon Road Bridge portion of the OR 22: North Santiam Highway Bridge Repairs Project, along the North Santiam Highway in Marion County, provides a good case study for temporary weight restriction impacts to freight mobility. For this project, ODOT had a failing concrete structure that crossed over a high volume roadway. Further complicating the matter, this particular route is the primary freight detour route when closures on I-5 in the Salem area are needed. Furthermore, this route was the only available detour route for mobile home traffic that exceeded 16' 2", due to vertical clearance restrictions on the system.

In order to strengthen and repair this structure, it was determined that crack sealing and epoxy dowelling would be needed to provide the required structural reinforcement. Considering the weakness of the bridge, drilling holes into the existing supports in order to install the dowels weakened the bridge enough that it needed to be weight restricted during construction.

As soon as it was determined that the weight restrictions would be necessary, the "Weight Restrictions on Bridges" policy (PMT 06-01) went into effect and MCTD, key ODOT staff, and freight industry stakeholders were contacted to establish a plan and a suitable detour route. The duration of the weight limitations were limited to times with the least impacts to traffic. Weight restrictions and closures were planned to provide windows for the over-height vehicles to cross at times that the bridge was not restricted. Using input from all parties involved, the Project

Team set up a detour route and a staging plan that reduced delays and minimized impacts to traffic mobility.

CHAPTER 6
DELAY

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CHAPTER 6 DELAY

- Delay Policy Considerations
- Detour Delay Considerations
- Staging Delay Considerations
- Corridor Delay Thresholds

DELAY POLICY CONSIDERATIONS

All construction projects will be evaluated for delay impacts to mobility and staging options will be carefully reviewed to minimize the duration and severity of necessary delay impacts.

In a memo prepared by Ralph Batenhorst of the Oregon Bridge Delivery Partners (OBDP), the importance of managing and minimizing delays has been clearly stated:

> *"Each corridor will need to be managed to minimize delays to the traveling public and to maximize flexibility in completing the work in a timely manner."*
>
> *"This will be accomplished through the implementation of traffic control strategies that minimize the impact of construction on the traffic-carrying capacity of each corridor."*
>
> Memo "Corridor Delay Thresholds" dated 04/20/05

By establishing corridor delay thresholds and tracking the amount of delay generated by construction activities, ODOT can plan projects so that impacts to mobility can be minimized.

DETOUR DELAY CONSIDERATIONS

Detour delay time is simply the amount of additional time it takes to travel a route once traffic is switched onto the detour. Depending on the length and nature of the detour, delay impacts to normal traffic are usually small, but impacts on mobility and freight traffic can be very large.

Significant delays to freight traffic can be caused by frequent stopping and restarting, stopping traffic at the bottom of steep grades, sending traffic through sharp corners, etc. When detour routes are established, special consideration must be given to the particular needs of freight traffic. If at all possible, the route should be driven in an actual freight vehicle to help confirm the adequacy of the proposed detour. The Motor Carrier Transportation Division (MCTD) upon request can facilitate a drive test of a proposed detour route with a tractor semi-trailer vehicle combination. Detour route(s) need to be reviewed for these impacts, and those that have the least detour delay times should be utilized whenever possible.

During the development of projects, special consideration should be made to eliminate or minimize detour delay time impacts. Whenever practical, the duration of time that detours are allowed should be limited. Innovative tools, such as incentive/disincentive clauses, or alternative contracting methods such as "A+B" contracting (see Chapter 9 for definitions), should be

considered. Designers should consider using prefabricated construction materials that will reduce the overall construction time, whenever possible. Construction methods that reduce construction time, such as selecting an exodermic deck replacement, should be considered.

STAGING DELAY CONSIDERATIONS

When evaluating staging options, the designer must take into account the impacts that each option will have in regards to delay time. Each option must be carefully evaluated and, when practical, the option with the least impacts should be selected.

Staging options that provide for continuous free-flow conditions with minimal delays and no restrictions should be used whenever possible. Freeway crossovers and full width detour structures on separate detour alignments are two examples of this type of design. They provide a work zone which can be traversed at regular speeds with little to no interference.

When staging options that provide for minimal delays cannot be used, options with only minor delays should be used. Staging that involves a controlled delay or a single lane closure would be examples of this type of design. This option would provide a work zone which would cause moderate delays, and possibly a significant reduction of speed, but would not restrict freight traffic.

When staging options that provide for minor delays cannot be used, other options with more significant delay times may need to be used. A staging plan that involves a two-way, one-lane configuration controlled by a temporary signal or flaggers is an example of this type of design. Since this option can cause significant delays to freight traffic, the MCTD Freight Mobility Coordinator should be contacted so that they can notify affected stakeholders of the anticipated delay.

Each project needs to be analyzed to ensure that sufficient capacity for the expected traffic volumes is maintained. All staging options that are reviewed must be able to accommodate the expected traffic volumes, especially during holidays or other peak hours of travel. If the traffic analysis shows that traffic volumes for a staging option will exceed capacity, then the designer will need to provide for additional capacity or find a way to reduce the traffic volumes. Night work can be used on many projects to avoid impacts during the day when traffic volumes are greater. Temporary detour structures or temporary bridge widening can be used to provide additional capacity when traffic volumes are too high to close travel lanes. Traffic volumes can be reduced through aggressive media campaigns and the use of message boards directing traffic to alternative routes.

The length of the work zone can directly affect the severity of the traffic delay and should be reviewed during the development of a staging plan. Projects that extend over a large section of road should be broken up into smaller segments whenever possible, so that the area of impact is reduced. On an urban modernization project, work should be limited to only a few blocks at a time if possible. On a rural preservation overlay project, the length of the work zone should be carefully controlled to minimize the amount of delay encountered.

Staging options need to be checked to avoid delays to freight traffic caused by frequent stopping and restarting, stopping traffic at the bottom of steep grades, sending traffic through sharp corners, etc. Staging options need to be evaluated for these impacts, and those that have the least delay times should be utilized whenever possible.

During the development of projects, special consideration should be made to eliminate or minimize staging delay time impacts. Whenever practical, the staging duration should be limited. Innovative tools, such as incentive/disincentive clauses, or alternative contracting methods such as "A+B" contracting, should be considered. Designers should consider using prefabricated construction materials that will reduce the overall construction time, whenever possible. Construction methods that reduce construction time, such as selecting an exodermic deck replacement, should be considered.

For holidays or other peak traffic times, it will be necessary to consider the capacity of the work zones with any lane reductions to determine if it can handle the traffic volumes without causing delays. On most major holidays, some events, and other peak travel periods, ODOT prefers to have lane reductions or restrictions removed in order to handle the higher traffic volumes and minimize delays. If lane reductions or restrictions cannot be lifted over these peak periods, then an exception (see below) should be sought and approved in the planning and design phases. If the capacity reduction will remain during the peak period, then it becomes crucial to provide enhanced public information outreach to warn motorists of potential delays and to suggest travel alternatives.

CORRIDOR DELAY THRESHOLDS

Corridor delay thresholds have been established for the routes covered by the four Corridor Mobility Committees for I-5 North, I-5 South, I-84 and US 26/97/20. Corridor-Level Traffic Management Plans (TMPs) have been developed for each of these four corridors as part of the Oregon Transportation Investment Act III (OTIA III) Program. Corridor delay thresholds for other highway corridors in the state will soon be established to help manage traffic mobility for Oregon's traveling public and freight industry. Construction activities in these corridors will need to be coordinated with construction activities in the key OTIA III corridors to ensure that statewide mobility goals are achieved. This coordination will occur as part of Corridor Mobility Committee and Region Mobility Committee activities.

The calculated delay thresholds are an attempt to quantify the maximum delay that would be considered tolerable by the traveling public as a result of construction activities. The delay thresholds were established using the following methodology:

1. Using segment lengths and assumed travel speeds for off-peak travel conditions, off-peak travel times were estimated for each segment.

2. Travel times for peak travel conditions were then estimated by increasing the off-peak travel times. Off-peak travel times were increased by 45 percent for urban areas, 30 percent for semi-urban areas, and 10 percent for all other areas.

3. Delay thresholds were then calculated to be 10 percent of the peak travel times.

Although it is recognized that meeting these thresholds will be a challenge during high traffic volume periods related to seasonal traffic, holidays, and special events, these thresholds will be in effect 24 hours per day, 365 days a year. To avoid undesirable delays during these high volume periods, special attention should be applied to staging techniques. If higher delays are unavoidable, an exception to the corridor delay thresholds may be sought. The exception process is discussed later in this Chapter.

The delay thresholds will be applied to all construction-related projects in the corridor including OTIA III, OTIA I and II, STIP, and local projects, where applicable. Short-term work zones associated with maintenance activities must also be considered during corridor mobility management.

In the Corridor-Level TMPs, the delay thresholds are compared to estimated delays for the OTIA III projects and some STIP Projects in the corridor as calculated by OBDP. Delay calculations for other construction projects will be prepared as data regarding project schedules and potential lane restrictions become available. This information will be collected as part of the Region Mobility Committee activities and the Corridor Mobility Committee activities.

Delay estimates should also be prepared for maintenance projects that have the potential to impact mobility through the corridor. For other, less restrictive maintenance activities, it will be at the discretion of the Regions as to whether or not delay estimates will be formally prepared. Regardless, the sum of the delay resulting from construction projects and from maintenance activities must fall below the applicable corridor or segment delay threshold. In cases where the delay from maintenance projects cannot be accommodated within the threshold, it will be necessary to reschedule the maintenance activities (e.g., during nighttime hours or to another time when construction-related delays are lower).

The comparisons between the estimated OTIA III delays and the overall delay thresholds will assist OBDP and ODOT in determining how travel will be impacted and how adjustments to the OTIA III Program and other projects will need to be made to achieve mobility goals in the corridor. Some projects may be scheduled concurrently, though work may take place at different times of day so that the projects may not actually be active simultaneously. This is not taken into account in the delay estimates since precise construction schedules have not been set. Once the projects are underway, data collection will identify these locations and provide a more accurate estimate of the delay impacts of active projects.

Once the delay impacts of projects have been established through actual field measurements (for projects under construction) or through estimation (for planned projects), the following steps will be taken to attempt to keep total delays associated with all construction and maintenance activity scheduled in the corridor or segment below the delay thresholds:

1. If delays for an individual project exceed the delay threshold, then adjustments to the schedule, adjustments to the staging, or adjustments to the traffic management strategies will need to be considered to reduce the delay below the threshold.

2. If project delays for a corridor fall below the delay threshold, the corridor or segment will be evaluated to determine if adequate delay time is available to accommodate other projects over the construction period.

3. If the corridor delay threshold is exceeded and the corridor or segment cannot accommodate existing projects, a review of project schedules, staging, and traffic management strategies will be conducted to determine if, and at what cost, the delays associated with existing projects can be reduced. Consideration will also be given to revising the schedules, staging, and traffic management strategies (like public information) of the other planned projects in the corridor so that new projects can be implemented in the corridor.

The estimated delays for each project contained in the Corridor-Level TMPs will be further refined and reported in the Project-Level TMPs and/or as part of Corridor/Region Mobility Committee activities. OBDP will be responsible for coordinating all Project-Level TMPs in the corridor to ensure that they are consistent with the mobility-related objectives of the corridor. OBDP will provide on-going coordination with the individual designers so that the Project-Level TMPs and associated Traffic Control Plans (TCPs) result in delays that are compatible with the segment and corridor delay thresholds presented in the TMPs. Traffic control strategies proposed by designers which have the potential to result in significant delays or which, when added to the estimated delays for other construction projects in the corridor, would exceed the segment or corridor delay threshold, will require further analysis. If such strategies and associated delays cannot be avoided, OBDP will coordinate with ODOT to identify potential changes to the schedule for that particular project or other projects in the corridor so as to minimize the impacts to corridor delay.

There is recognition that specific work activities and time periods may make it infeasible to achieve the delay thresholds in a particular segment or corridor. In these cases, an exception may be sought. The basis for exceptions would be an inclusive evaluation of the following minimum criteria: 1) Alternatives analysis demonstrating the least amount of overall delay impact and potential economic impact to communities and businesses; 2) Direct project cost comparisons of each staging alternative; and 3) Ability to communicate with the traveling public and trucking industry to gain buy-in and awareness of the impacts and means to mitigate those impacts.

Any and all exceptions will require the approval of the Statewide Traffic Mobility Manager following receipt of a request made by the appropriate Region Manager for deviation from the standard. The Statewide Traffic Mobility Steering Committee will subsequently review all such exemptions granted. If an exception is necessary, it should be considered and processed during the planning and design stages of a project and not immediately before a project is to begin. Similarly, an exception will not be an acceptable means of addressing actual delay during construction.

Upon approval of the exception, the delay thresholds will be modified to reflect the parameters of the exception. Such modifications will remain in effect for the duration of the specific project, after which the delay thresholds will revert to those documented in the Corridor-Level TMP.

It is important to note that the estimated delays, as well as measured actual delays, are intended to represent the *maximum* delay that would be experienced by motorists during any time period during the construction. For any given time period, however, the estimated or measured delays represent the *average* delay for all vehicles during that time period. Thus, the intent is not necessarily to determine the delay for the vehicle that is delayed the most. Some motorists may experience more delay while some motorists may experience less delay during the targeted period.

Ideally, such estimates and measurements would be conducted for each hour of the day and for each unique traffic control strategy. With consideration of the limited resources involved, it is recommended that such estimates and measurements be conducted for the highest volume time period of each unique traffic control strategy. For example, if a work zone includes a lane restriction during nighttime construction activities only, it is recommended that the delay estimates or measurements be conducted for the highest volume hour during the nighttime activities to determine the maximum delay resulting from the lane restriction and again for the highest volume during the day (e.g., the afternoon peak hour) to determine the maximum delay resulting from the base work zone configuration (i.e., when all lanes are open but the capacity is reduced due to work zone speed limits, rubbernecking, etc.).

Actual delay during construction will be measured by OBDP at the project-level and corridor-level through site observations, travel time runs, transponder readers, and other applicable means. The delay measurements will be compared to the delay thresholds to determine if expectations are being met and to identify high-delay locations that might require mitigation actions.

Work zones identified as having unacceptable delays will be subject to mitigation. The Project-Level TMPs will include a contingency plan for addressing such conditions. The construction contractor will be required to implement mitigation strategies, as necessary, to reduce the delay in the subject work zone.

DELAY CASE STUDY: I-5 SUTHERLIN TO ROSEBURG DESIGN-BUILD PROJECT

The Interstate 5 - Sutherlin to Roseburg design-build project provides a good case study for delay impacts to mobility. For this project, ODOT closed all the southbound lanes (two) of I-5 and staged a traffic diversion using the northbound lanes (two) of I-5. The diversion reduced traffic to one lane in each direction for 2 miles.

To determine the impacts to mobility of diverting traffic to one lane, the Project Team performed a traffic analysis during the design stage. The analysis showed traffic delays would be minimal during peak hours, with no negative impacts to mobility. The diversion was anticipated to last 13 weeks.

Complicating the matter, the diversion occurred during the Easter Holiday and week of Spring Break. The holiday capacity of the work zones would potentially not handle the anticipated traffic volumes without causing excessive delays.

In this illustration, the Project Team would need to explore various options to manage the impacts to mobility due to the one-time increase in holiday traffic volumes. The options available to the Project Team would include:

1. Accelerate the construction (incentive contracting using 24 hour work and extra manpower) to allow for completion of the traffic diversion and lane reductions stage prior to the holiday.
2. Temporarily remove the traffic diversion and lane reductions in order to handle the higher traffic volumes and minimize the delays.
3. Explore other design/detour options to eliminate or minimize delays.
4. Seek an exception to the delay threshold requirements for the project to allow for the increased delays that would result due to the one-time increase in traffic volumes.

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CHAPTER 7
DETOURS

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CHAPTER 7 DETOURS

- Detour Policy Considerations
- Detour Notification and Communication
- Selecting and Evaluating Detour Routes
- Out-of-Direction Travel Considerations
- Detour Delay Time Considerations
- Special Detour Considerations
- Detour Case Study

DETOUR POLICY CONSIDERATIONS

In a memo, Director Warner further addressed the importance of engaging industry stakeholders in ODOT's project development process:

> *"The process is intended to be collaborative between ODOT and industry. Industry is to participate in initial and continuing conversations about detour alternatives and mitigation requirements. The purpose of this requirement is to enable ODOT to take advantage of industry practical knowledge and to build trust between the two parties."*
>
> *"It is important for the various ODOT participants to be on the same page, but ODOT staff are **not** to work to reach a conclusion on the best detour or other traffic changes before beginning an earnest conversation with industry."*
>
> "Freight Mobility – ODOT Commitments With The Freight Industry" dated 12/22/04

Communication and engagement of industry stakeholders are an integral part of freight mobility during the development of detours.

DETOUR NOTIFICATION AND COMMUNICATION

The Motor Carrier Transportation Division (MCTD) is the primary contact to engage industry stakeholders for the development of off-site detours. There is a distinction to be made between detours necessitating out-of-direction travel and on-site traffic diversion to simply move traffic over. During project development, the MCTD Freight Mobility Coordinator needs to be notified about any planned off-site detour routes. When considering detour alternatives, the MCTD Freight Mobility Coordinator must be notified so they can engage key industry stakeholders in the project development process. On-site traffic diversions do not require this notification.

During construction, ODOT has committed to provide notification to industry stakeholders through the MCTD Freight Mobility Coordinator prior to moving traffic onto a planned detour route. Written notification (form #734-2357) to the MCTD Freight Mobility Coordinator must take place twenty-eight days prior to moving traffic onto the detour route, so they can contact all affected users at least twenty-one days before the detour route goes into effect. Written notification needs to be sent to the MCTD Freight Mobility Coordinator as soon as the detour

route is no longer needed, so they can relay this information to all affected parties as soon as possible.

The MCTD Freight Mobility Coordinator will identify the industry stakeholders which are affected by the detour and will notify permit holders of the detour route. In the case of single trip permits, the MCTD Freight Mobility Coordinator will use the permits to direct over-dimensional units to use the detour routes.

SELECTING AND EVALUATING DETOUR ROUTES

Any and all planned detours must take into account and provide for all traffic that is legally allowed to use the route. Before selecting a detour route, the MCTD Freight Mobility Coordinator and industry stakeholders must be engaged to contribute to the process. The MCTD Freight Mobility Coordinator should determine what types of traffic currently use the route that will be closed. Any and all traffic that utilizes the existing route must be provided for on the detour route. If over-dimensional units use the existing route but cannot use the detour route, then either a different detour route is needed, or a second detour route for over-dimensional units is needed.

All detour routes need to be checked for restrictions which could affect freight traffic. All structures along the route need to be checked for weight restrictions. All turning movements need to be evaluated to see if they safely provide for turning movements and off tracking. All horizontal and vertical pinch points need to be checked to ensure that all vehicles can safely traverse the entire route. Once a detour route clear of restrictions has been identified, the route should actually be tested with a truck to check for problems with sight distance or grade if possible.

The approved detour route(s) should be those that have the least out-of-direction travel and create the least delays to traffic. The MCTD Freight Mobility Coordinator and industry stakeholders can be valuable assets in determining the best routes due to their familiarity with secondary routes and knowledge of restrictions on those routes.

OUT-OF-DIRECTION TRAVEL CONSIDERATIONS

Out-of-direction travel, simply stated, is the additional distance that a vehicle must travel on a detour route beyond what would need to be traveled on the existing route. If the existing route is 10 miles long without the detour, and 14 miles long when traffic is routed onto the detour, then the out-of-direction travel would be four miles.

Out-of-direction travel impacts to normal vehicles are usually smaller than out-of-direction travel impacts to freight vehicles. When detour routes are established, the additional length that freight vehicles must travel impacts the weight/mile taxes, permits, and distance allowances. Detour route(s) need to be reviewed for these impacts, and those that have the least out-of-direction travel should be utilized whenever possible.

During the development of projects, special consideration should be made to eliminate or minimize out-of-direction travel impacts. Whenever practical, full width on-site detours, or diversions, should be utilized. Innovative tools, such as incentive/disincentive clauses, or alternative contracting methods such as "A+B" contracting, should be considered to shorten the duration of the impact. Designers should consider using prefabricated construction materials that will reduce the overall construction time, and select construction methods that reduce overall construction duration.

DETOUR DELAY TIME CONSIDERATIONS

Detour delay time is simply the amount of additional time it takes to travel a route once traffic is switched onto the detour. Depending on the length and nature of the detour, delay impacts to normal traffic are usually small, but impacts on mobility and freight traffic can be very large.

Significant delays to freight traffic can be caused by frequent stopping and restarting, stopping traffic at the bottom of steep grades, sending traffic through sharp corners, etc. When detour routes are established, consideration must be given to the special needs of freight traffic. If at all possible, the route should be driven in an actual freight vehicle to help identify problem areas. Detour route(s) need to be reviewed for these impacts, and those with the least detour delay times should be utilized whenever possible.

During the development of projects, special consideration should be made to eliminate or minimize detour delay time impacts. Whenever practical, the duration of time that detours are allowed should be limited. Innovative tools, such as incentive/disincentive clauses, or alternative contracting methods such as "A+B" contracting (see Chapter 9 for definitions), should be considered. Designers should consider using prefabricated construction materials that will reduce the overall construction time, whenever possible. Construction methods that reduce construction time, such as selecting an exodermic deck replacement, should be considered.

SPECIAL DETOUR CONSIDERATIONS

There are several special considerations that must be taken into account when evaluating or designing a detour route. These include, but are not limited to, the following:

1. How will the detour route affect emergency services response times?
2. Will vehicles transporting hazardous materials be able to use the planned detour route?
3. Are any other projects using the existing route as a detour?
4. Are there other projects along the proposed detour route which will restrict traffic?
5. Is there another detour route available if something happens to the proposed detour route?

If out-of-distance travel or detour delay times are excessive, then special coordination with emergency services must be made. If hazardous material is transported along the existing route, then the detour route must be evaluated to see if it can accommodate it as well. If there is a conflict with other projects, then the work should be rescheduled to eliminate the conflict. A

back-up detour route should always be identified in case of a natural disaster or unplanned restriction on the proposed detour route.

DETOUR CASE STUDY: CHEHALEM CREEK BRIDGE PROJECT

The Chehalem Creek Bridge Project, along the Yamhill-Newberg Highway (OR 240) in Yamhill County, provides a good case study for detour impacts to mobility and freight traffic. For this project, ODOT had a failing timber structure surrounded by sensitive wetlands, endangered fish habitat, and a FEMA flood plain. Further complicating the matter, this particular route carried around 7,000 vehicles per day, including a significant truck percentage (8.2%). Due to the excessive environmental impacts and costs associated with a temporary bridge or staging scenario, the option for an off-site detour was selected.

Initially a short (1/2 mile long) detour was identified using nearby county roads. This route worked quite well for passenger car traffic, but would not accommodate freight traffic. Upon examining the detour route for impacts to trucks it was noted that one of the bridges along this route was weight restricted and the turning radii at the intersections were too sharp for trucks to make the corners safely.

By working with MCTD and the freight industry, the Project Team identified a second, much longer detour route that had previously been utilized as an emergency truck detour. Although this route was four times longer than the initial detour route, the actual out-of-distance travel was the same.

Since the delay time was considered a significant impact to the trucking industry, modifications to the detour route were implemented to reduce the detour delay time. These modifications included radii improvements to three intersections, eliminating a four way stop along the route, changing through and stop movements at several intersections, and improving the sight distance along the route. By doing so, the project team was able to provide free-flow conditions along the route, avoiding back-ups and minimizing delay.

By providing a detour route, construction of the bridge was completed in about one-fourth the time that would have been needed to stage the construction. The overall cost of the project was also reduced without impacting the sensitive environmental concerns, and in the meantime, the infrastructure of the local road system was enhanced. Freight and other traffic experienced minimal delays and the work zone was much safer with the removal of active traffic from the construction site.

CHAPTER 8
STAGING

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CHAPTER 8 STAGING

- Staging Policy Considerations
- Staging Standards
- Staging Notification and Communication
- Selecting and Evaluating Staging Options
- Staging Delay Considerations
- Special Staging Considerations
- Staging Case Study

STAGING POLICY CONSIDERATIONS

Providing Traffic Control Plans with staging that maintains appropriate horizontal and vertical clearance will enable ODOT to repair and upgrade the existing system while transporting freight within the State of Oregon. Staging restrictions will be carefully monitored so that they do not impair the movement of freight critical to Oregon's economy. All construction projects will be evaluated for impacts to freight mobility, and staging options will be carefully reviewed to minimize the duration and severity of necessary impacts.

In the Traffic Control Plans (TCP) Design Manual, the State Traffic Control Plans Engineer has laid out the existing staging policies contained within ODOT's special provision language, as stated below:

> *"When narrowing the roadway…notify the MCTD Technical Coordinator, 550 Capitol Street NE, Salem, OR 97301-2530, FAX (503) 373-1940, and the Engineer, in writing, at least 28 days before this work begins. Include the reduced lane width dimension of each stage and the anticipated duration of the reduction. Do not narrow the roadway until the Engineer approves it and the area is adequately signed according to the TCP and Section 00225."*
>
> ODOT TCP Design Manual, page 53

> *"When reducing the vertical clearance…notify the MCTD Technical Coordinator, 550 Capitol Street NE, Salem, OR 97301-2530, FAX (503) 373-1940, and the Engineer, in writing, at least 28 days before this vertical clearance reduction takes place. Include the reduced vertical clearance dimension of each stage and the anticipated duration of reduction. Do not reduce the vertical clearance until the Engineer approves it and the area is adequately signed according to the TCP and Section 00225."*
>
> ODOT TCP Design Manual, page 54

STAGING STANDARDS

During construction, the horizontal clearance of structures on all interstate freeways shall not be reduced to less than 28 feet for two lanes of one-way traffic, and 19 feet for one lane of traffic, unless approved by the State Traffic Control Plan Engineer. During construction, the MCTD Freight Mobility Coordinator shall be notified a minimum of twenty-eight days before temporarily reducing the horizontal clearance to less than 22 feet for one lane of traffic between positive barriers or less than 28 feet for two lanes of one-way traffic between positive barriers.

During construction, the horizontal clearance of structures on all other routes on the National Highway System shall not be reduced to less than 28 feet for two-way traffic, and 16 feet for one-way traffic, unless approved by the State Traffic Control Plan Engineer. During construction, the MCTD Freight Mobility Coordinator shall be notified a minimum of twenty-eight days before temporarily reducing the horizontal clearance to less than 22 feet for one lane of traffic between positive barriers or less than 28 feet for two-way traffic between positive barriers.

During construction, the vertical clearance of any structure shall not be temporarily reduced, unless approved by the State Traffic Control Plan Engineer. During construction, the MCTD Freight Mobility Coordinator shall be notified a minimum of twenty-eight days before temporarily reducing the vertical clearance on any structure.

STAGING NOTIFICATION AND COMMUNICATION

The Motor Carrier Transportation Division (MCTD) is the primary contact to engage industry stakeholders for staging restrictions. During project development, the MCTD Freight Mobility Coordinator should be notified about any planned restrictions that will potentially impact freight traffic. When considering staging alternatives, the MCTD Freight Mobility Coordinator must be notified so they can engage key industry stakeholders in the project development process.

During construction, ODOT has committed to provide notification to industry stakeholders through the MCTD Freight Mobility Coordinator prior to implementing any staging restrictions. Written notification (form #734-2357) to the MCTD Freight Mobility Coordinator must take place twenty-eight days prior to implementing the staging restrictions, so MCTD can contact all affected users at least twenty-one days before the staging restrictions go into effect. Written notification needs to be sent to the MCTD Freight Mobility Coordinator as soon as the staging restrictions are no longer needed, so they can relay this information to all affected parties as soon as possible.

The MCTD Freight Mobility Coordinator will identify the industry stakeholders affected by the staging restrictions and will notify permit holders of these restrictions. In the case of single trip permits, the MCTD Freight Mobility Coordinator will use the permits to limit or detour over-dimensional units while staging restrictions are in effect.

SELECTING AND EVALUATING STAGING OPTIONS

When evaluating staging options, the designer must take into account and provide for all traffic that is legally allowed to use the route. Before selecting a staging option which may impact freight traffic, MCTD and industry stakeholders must be engaged to contribute to the process. The MCTD Freight Mobility Coordinator can determine what types of traffic currently use the

affected route. If over-dimensional units use the existing route, a detour route must be provided and special consideration must be given to reduce the duration of the staging restriction.

When reviewing staging options during project development, it is very important to compare what the overall impacts to industry stakeholders will be with each option. The effects of impact duration and impact severity need to be evaluated. In some cases, a complete route closure with a detour over a shorter period will have a smaller overall impact than an expensive, prolonged staging plan that strives to keep the route open. Many stakeholders prefer a project with a shorter duration and a severe impact (i.e. brief closure with detour), over a project with a prolonged duration with only minor impacts.

If staging restrictions would limit or delay the passage of emergency services vehicles, then special coordination with these stakeholders must be made. Temporary weight restrictions should be avoided if at all possible, but if they are needed, the MCTD Freight Mobility Coordinator and industry representatives must be engaged in the decision making process. All of the requirements specified in ODOT's "Weight Restrictions on Bridges" Policy (PMT 06-01) must be followed before a staging weight restriction can take place.

STAGING DELAY CONSIDERATIONS

When evaluating staging options, the designer must take into account the impacts that each option will have in regards to delay time. Each option must be carefully evaluated and, when practical, the option with the least impacts should be selected.

Each project needs to be analyzed to ensure that sufficient capacity for the expected traffic volumes is maintained. All staging options reviewed must be able to accommodate the expected traffic volumes at all times, especially during peak hours of travel. If the traffic analysis shows that traffic volumes for a staging option will exceed capacity, then the designer will need to provide for additional capacity or find a way to reduce the traffic volumes. If this cannot be done, then the staging option should be eliminated. Night work can be used on many projects to avoid impacts during the day when traffic volumes are greater. Temporary detour structures or temporary bridge widening can be used to provide additional capacity when traffic volumes are too high to close travel lanes. Traffic volumes can be reduced through aggressive media campaigns and the use of message boards directing traffic to alternative routes.

Staging options that provide for continuous free-flow conditions with minimal delays and no restrictions should be used whenever possible. Freeway crossovers and full width detour structures on separate detour alignments are two examples of this type of design. They provide a work zone which can be traversed at regular speeds with little to no interference.

When staging options that provide for minimal delays cannot be used, options with only minor delays should be used. Staging that involves a controlled delay or a single lane closure would be examples of this type of design. This option would provide a work zone with moderate delays, and possibly a significant reduction of speed, but would not restrict freight traffic.

When staging options that provide for minor delays cannot be used, other options with more significant delay times may need to be used. A staging plan that involves a two-way, one-lane configuration controlled by a temporary signal or flaggers is an example of this type of design. Since this option can cause significant delays to freight traffic, the MCTD Freight Mobility Coordinator should be contacted so they can notify affected stakeholders of the anticipated delay.

The length of the work zone can directly affect the severity of the traffic delay and should be reviewed during the development of a staging plan. Projects that extend over a large section of road should be broken up into smaller segments whenever possible, so that the area of impact is reduced. On an urban modernization project, work should be limited to only a few blocks at a time if possible. On a rural preservation overlay project, the length of the work zone should be carefully controlled to minimize the amount of delay encountered.

Staging options need to be checked to avoid delays to freight traffic caused by frequent stopping and restarting, stopping traffic at the bottom of steep grades, sending traffic through sharp corners, etc. Staging options need to be evaluated for these impacts, and those that have the least delay times should be utilized whenever possible.

During the development of projects, special consideration should be made to eliminate or minimize staging delay time impacts. Whenever practical, the staging duration should be limited. Innovative tools, such as incentive/disincentive clauses, or alternative contracting methods such as "A+B" contracting (see Chapter 9 for definitions), should be considered. Designers should consider using prefabricated construction materials that will reduce the overall construction time, whenever possible. Construction methods that reduce construction time, such as selecting an exodermic deck replacement, should be considered.

SPECIAL STAGING CONSIDERATIONS

There are several special considerations that must be taken into account when evaluating or designing a staging option. These include, but are not limited to, the following:

1. How will the staging affect emergency services response times?
2. How will other projects be affected by the staging?
3. Are there any ways to provide windows for unrestricted freight movement between stages?

If staging would limit or delay the passage of emergency services vehicles, then special coordination with these stakeholders must be made. If there is a conflict with other projects, then the work should be rescheduled to eliminate the conflict. If windows of unrestricted freight movement can be created while transitioning between stages, then this should be discussed with stakeholders as a viable option.

STAGING CASE STUDY: LAKE CREEK BRIDGE PROJECT

The Lake Creek Bridge Project, along the Santiam Highway (US 20) in Jefferson County, provides a good case study for staging impacts to freight mobility. For this project, ODOT had a failing concrete structure on a freight route surrounded by sensitive wetlands, endangered fish habitat, and archaeological sites. This particular freight route carried around 5,500 vehicles per day with severe weekend fluctuations and had a very high truck percentage (23%). To further complicate the situation, the project was located at the bottom of a steep grade.

To minimize environmental impacts, the team initially looked at a single lane detour structure controlled by a temporary traffic signal or flaggers. This option looked like it might work for passenger car traffic, but it did not work for freight traffic. Upon examining this staging option for impacts to trucks, it was noted that significant queuing and delays would result from stopping trucks at the bottom of this steep grade. With the high truck percentage along this route (23%), the queues would backup literally for miles into sharp corners. Attempting to stop heavily loaded trucks going down the grade on the other side provided for another dangerous situation.

Considering the needs of MCTD and the freight industry, the project team selected a second option that utilized a two-lane detour, allowing for safe passage of all traffic without excessive queuing. The reversing curves in the detour alignment were modified to permit truck traffic to travel through the construction zone at only a slightly reduced speed. This staging option did not force freight traffic to stop at the bottom of the steep grade before going up, or stop traffic while going down the grade, significantly reducing staging delay time. With the two-lane detour, over-dimensional loads did not need to be restricted from the route during construction, and traffic was able to travel this route with minimal delays.

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CHAPTER 9
DESIGN CONSIDERATIONS

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CHAPTER 9 DESIGN CONSIDERATIONS

- Evaluation of Alternative Designs
- Design Materials
- Construction Methods
- Contracting Tools
- Design Considerations Case Study

EVALUATION OF ALTERNATIVE DESIGNS

During the development of projects, special consideration to alternative design practices should be made to eliminate or minimize impacts to traffic. Whenever practical, design options should be used which will minimize delays and the overall duration of the project. Alternative construction materials, construction methods, and contracting methods should be used to reduce construction time and minimize impacts whenever possible.

Contacts with industry stakeholders, other states, and national construction organizations should be established to keep up with new technology and new methods that can be utilized for construction projects. There are very few truly unique problems in transportation. Most issues that arise during the development of a project have surfaced before in other locations. If a problem arises which ODOT has not faced before, the project team should identify others who have faced a similar problem, evaluate how they addressed the problem, and review the lessons learned. This will increase options to help make better decisions and may offer protection from repeating the mistakes of others.

DESIGN MATERIALS

When selecting design materials, it is important to evaluate the impacts these will have on construction time. Whenever possible, prefabricated materials or other construction materials that reduce construction time should be used. If the use of prefabricated materials can shorten the duration or completely eliminate a freight restriction, this should be considered.

Designs which use materials which will impose restrictions on freight traffic should be carefully evaluated for acceptable alternatives. If traffic will not be able to travel over a structure while half of the bridge deck is curing, then consideration must be given to selecting different materials which can avoid this restriction. Other states have tested and used different types of materials for accelerating construction projects, especially in areas with high traffic volumes.

There are several materials ODOT has already used which can greatly reduce traffic impacts. A few examples of these include the following:

- Pre-cast, Pre-stressed Bridge Components—By using prefabricated materials, on-site impacts can be reduced to assembly work only.

- Concrete Accelerators—Accelerators and other concrete admixtures can greatly reduce cure times for concrete members, reducing delay times and impacts to traffic.

- PPC for Deck Overlays—By using Polyester Polymer Concrete instead of more traditional materials, cure times are greatly reduced and traffic restrictions to minimize vibration can be eliminated.

Continued research into new materials should be a priority so that ODOT can steadily increase design options and reduce construction and maintenance impacts to mobility and freight traffic.

CONSTRUCTION METHODS

When selecting design methods, it is important to evaluate what others have done and how these methodologies impacted traffic mobility. Whenever possible, methods which reduce construction time and delays should be used. Methods which allow significant portions of the work to be completed without affecting traffic should be used. If a method can eliminate or ease a freight restriction, this should be considered. Methods which other states have tested and used for accelerating construction projects should be evaluated and used whenever possible.

There are several methods that ODOT has already learned which greatly reduce traffic impacts. These include, but are not limited to, the following:

- Trenchless Technology—By using boring, jacking, and ramming methods, culvert construction can be completed without costly detours or staging needing complicated shoring designs.

- Exodermic Deck Replacements—By using this process, the contractor can completely replace a bridge deck with only short-term (4-10 hour) night closures. A segment or two of the deck is replaced each night with a prefabricated segment, and the bridge can be reopened to normal traffic flow during the day.

- Controlled Delay Closures—By using a controlled delay instead of staging for short-term work, freight restrictions can be placed with only moderate delays. The contractor effectively has the entire road closed for construction work, while all the traffic experiences is a mild queuing from slow moving traffic.

- Parallel Bridge Construction—This method has been used in other states with great success. It involves constructing an overpass on the side of the freeway shoulder parallel to the roadway. Once the structure is completed it is raised with cranes and swung into position over the freeway.

Staging methods that provide for continuous free-flow conditions with minimal delays and no restrictions should be used whenever possible. Staging options need to be checked to avoid delays to freight traffic caused by frequent stopping and restarting, stopping traffic at the bottom of steep grades, sending traffic through sharp corners, etc. Staging options need to be evaluated for these impacts, and those that have the least delay times should be utilized whenever possible.

CONTRACTING TOOLS

Innovative contracting tools can and should be used, when appropriate, to minimize delay times and restriction impacts to traffic. Contracting tools can be used to either directly control impacts or to encourage innovation on the part of the construction contractor. Used separately or combined with other methods, these contracting tools can be an effective means to reduce construction duration and impacts.

There are several contracting tools ODOT already employs to minimize traffic impacts and provide for greater mobility. These include, but are not limited to, the following:

- Incentive/Disincentive Clauses—By using incentive/disincentive clauses, contractors are given extra motivation to find innovative ways to minimize construction impacts. An innovative contractor can increase its profit margin by finding ways to accelerate construction and minimize construction impacts. The extra cost to the department is easily covered by savings derived from the reduced construction time.

- A+B Contracting—By using this contracting method, contractors are rewarded by finding ways to reduce the contract duration. They can increase their profit margin by utilizing additional resources to speed up construction. Once more, the extra costs are covered by savings derived from the reduction in construction duration.

- Interim Completion Dates/Work Windows—By using this method, work which has the greatest impacts to freight and other traffic can be limited to certain timeframes and durations. The project team can 1) limit closures and restrictions so they can only take place during specific windows, resulting in less impact on traffic; and 2) enforce these limitations with severe penalties or damages.

The use of alternative construction materials, construction methods, and contracting methods, whether separately or combined, can significantly reduce construction time and minimize impacts, increasing mobility.

DESIGN CONSIDERATIONS CASE STUDY: MILL CREEK BRIDGE PROJECT

The Mill Creek Bridge Project, along the Warm Springs Highway (US 26) in Wasco County, provides a good case study for special design considerations to reduce impacts to mobility and freight traffic. For this project, ODOT had a bridge deck failure on a historic steel truss structure, which also happened to be one of the highest bridges in Oregon. The project was located on the Warm Springs Indian Reservation and was surrounded by sensitive archaeological sites, cultural sites, and endangered species. Further complicating the matter, this particular route is a primary freight route that carries around 5,000 vehicles per day, including a significant truck percentage (15%).

Initially, three options were considered:

1. Close the road and detour all traffic until the bridge is completed;
2. Build a single-lane detour bridge and alternate traffic along it; or

3. Re-align the highway and build a parallel structure.

Unfortunately, ODOT could not re-align the highway due to the excessive cost and environmental impacts. ODOT also could not utilize a single lane detour bridge due to adverse roadway geometry and safety concerns with traffic queues backing up into sharp curves. The roadway also could not be closed during construction because there were no suitable detour routes available and the impacts to the freight industry and the traveling public would be extreme (approximately $265,000 - $316,000 per day).

Since the initial options would not work, the Project Team began seeking alternative construction methods. By meeting with the MCTD Freight Mobility Coordinator and representatives from the freight industry, the Project Team identified alternative construction materials and alternative construction methods successfully used in other states. Based on this input, the Project Team decided upon a new process (exodermic deck replacement) used in New York and Illinois that required only short term closures. This exodermic deck replacement process enabled ODOT to replace small sections of the bridge with precast modular joint panels which fit together like a large jigsaw puzzle. The roadway was closed for four days each week starting on Sunday night, sections of the deck were cut out, the missing sections were replaced with new precast sections, and the route was reopened to traffic each Friday morning without any restrictions. The contractor worked 24 hours a day during the closures. The entire deck was replaced in four weeks.

By working closely with the MCTD Freight Mobility Coordinator and freight stakeholders, it was determined when the route should be opened and closed, so truckers could plan their trips.. Since the closures occurred on a set schedule, fewer vehicles were required to use the extensive detours. With the exodermic deck replacement process, the project did not have any impacts on the sensitive cultural, archaeological, or environmental sites adjacent to the bridge. By using this unusual method, and by closely coordinating the closures with the traffic flows, the deck was successfully replaced with minimal impacts to traffic and freight mobility and greater safety to both the contractor and the traveling public.

CHAPTER 10
OTHER CONSIDERATIONS

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CHAPTER 10 OTHER CONSIDERATIONS

- Importance of Secondary Routes
- Congestion Impacts
- Risk Analysis Considerations
- Emergency Freight Mobility Plan
- Permitting Requirements

IMPORTANCE OF SECONDARY ROUTES

As Oregon's existing infrastructure slowly ages, new problems for freight mobility will continually arise. Oregon's current freight routes are plagued with problems and restrictions, and usable detour routes are often expensive and inconvenient to use. In order to take some of the stress off of the system, ODOT should consider creating redundancy through the addition of more usable routes.

Providing well maintained roadways clear of obstacles is an often overlooked aspect of mobility important to transporting freight within the State of Oregon. Poorly maintained roadways, especially secondary routes, force freight traffic to concentrate on less direct routes. This concentration of freight traffic increases stress and wear on these routes that might easily be avoided.

Many secondary highways provide shorter, more direct routes for freight traffic, but cannot be used due to marginal surface conditions. Rough roadways with numerous potholes and sunken grades can delay freight traffic and increase vehicle maintenance costs. These roadways often have sharp curves, little or no shoulder, and steep grades which discourage freight traffic.

Special consideration should be given to improving conditions and clearing these restrictions from secondary highways to provide more options for freight mobility. As more secondary freight routes become available, more redundancy will be created, and it will be easier to work on primary freight routes with less disruption. As more secondary routes are opened, transport times for moving freight will decrease, providing for lower costs and more economic benefits.

CONGESTION IMPACTS

As the population of Oregon grows, congestion on the transportation system will create new challenges for mobility and freight traffic. In urban areas, traffic congestion already contributes to significant delays during peak travel times. ODOT should consider reducing areas of heavy congestion whenever possible by creating additional lane capacity. As these areas of heavy congestion are cleared, moving freight will become easier and Oregon's economy will benefit.

The impacts of congestion on mobility and freight traffic are often overlooked within the State of Oregon. Areas of heavy congestion create expensive delays that force freight traffic to modify schedules or detour to other routes. In this manner, areas of heavy congestion affect freight traffic the same way that height, width, weight, or other restrictions affect freight traffic.

Special consideration should be given to improving conditions and clearing areas of heavy congestion from the system to provide more options for mobility and freight traffic. As heavy congestion in these areas is reduced, more options for freight travel will be created. As more capacity is added to the system and congestion is alleviated, transport times for moving freight will decrease—providing for lower costs and more economic benefits.

RISK ANALYSIS CONSIDERATIONS

As Oregon's existing infrastructure slowly ages, new problems for mobility and freight traffic will continually arise. A system is needed to anticipate and track new problems such as the recent issue with cracked bridges, before they become serious. Each route should be evaluated for potential risks and these risks should be tracked and addressed. This approach could proactively prevent restrictions from occurring on the transportation system.

When new restrictions are identified, an analysis should be completed to determine if the problem could have been anticipated, and if there are other areas on the system that are currently at risk for having the same problem. Currently, bridges and active slides are carefully inspected and monitored to prevent problems, but other roadway features such as culverts and other drainage features are not monitored. These potential vulnerabilities to the system need to be identified and monitored.

EMERGENCY FREIGHT MOBILITY PLAN

Oregon's existing transportation system relies on several primary routes for freight mobility, with very few secondary routes available. In the event of a large scale natural disaster or other large scale emergency, several of these routes may be taken out of operation. To provide for the continuous movement of freight during events such as these, an emergency freight mobility plan is needed.

Creating redundancy on Oregon's transportation system through the addition of more usable freight routes will help protect freight movement. Freight routes that are deemed as critical to transporting freight, such as the freeway system, should have at least two usable secondary routes clear of restrictions as alternative routes. Other primary freight routes should have at least one usable secondary route clear of restrictions to help ensure mobility during an emergency.

Establishing an emergency freight mobility plan to restore routes affected by a large scale natural disaster or other large scale emergency should be developed. This plan should include the following:

1. A method for determining the condition of freight routes and alternative routes after an emergency;
2. A strategy for closing unsafe routes and routing freight around obstructions;
3. A plan for getting critical routes, or their alternates, back into operation in the shortest possible time;

4. A plan for getting other primary routes, or their alternates, back into operation in the shortest possible time; and
5. A plan for restoring the remainder of the affected freight routes.

The emergency freight mobility plan should be coordinated and discussed along with other emergency response plans.

PERMITTING REQUIREMENTS

The Motor Carrier Transportation Division (MCTD) issues single-trip and annual variance permits for overweight, over-height, over-width, over-length, and other unusual truck loads. The permits include routing plans, road restriction information, and other permit conditions. Permits and routing cover state and federal highways. They can also cover county roads, with county approval, but most Oregon counties issue their own permits. MCTD issues nearly 100,000 complex single-trip permits each year and manages the work of private parties that process requests for about 50,000 continuous, annual variance permits each year. Oregon participates in the Western Regional Permit Agreement that makes it possible for truckers to obtain permits for travel in nine other states.

Truckers will need an over-dimension variance permit whenever their vehicle combination exceeds maximum size and/or weight limits. A permit is also needed to haul any single, non-divisible load for which any one of the following conditions apply:

- ✓ Width of the load or hauling equipment exceeds 8 feet, 6 inches;
- ✓ Height of vehicle or vehicle combination and load exceeds 14 feet;
- ✓ Any single axle weight exceeds 20,000 pounds;
- ✓ Any tandem axle weight exceeds 34,000 pounds;
- ✓ Gross combination weight exceeds 80,000 pounds;
- ✓ Front overhang exceeds 4 feet beyond the front bumper of the vehicle;
- ✓ Load greater than 40 feet, exceeding 5 feet beyond the end of the semi-trailer, or load less than or equal to 40 feet, exceeding 1/3 of the wheelbase of the combination, whichever is less;
- ✓ Gross weight of a group of axles exceeds those set forth in the legal weight table shown on the reverse of *Group Map 1*; or
- ✓ Vehicle combination length exceeds those authorized on the reverse of *Group Map 1*.

Group Map 1 can be found at http://www.odot.state.or.us/forms/motcarr/od/8100.pdf

When planning construction methods and impacts, it is important to become familiar with the permit restrictions placed on loads that use the impacted route. Single trip permits often have periods of time where travel is restricted. For example, loads that are wider than ten feet cannot travel on weekends between Memorial Day and Labor Day. Loads wider than 12 feet are additionally restricted so that they cannot travel at night. It is important to become familiar with the permit restrictions on the impacted route so that loads are not restricted during their permitted hours of operation.

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APPENDICES

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APPENDICES

A. Useful Web Sites

B. Key Policies and Memos

(1) Technical Bulletin No. HDM 05-01 Horizontal and Vertical Clearances for Large Loads on Interstate Freeways
(2) Weight Restrictions on Bridges Policy (PMT 06-01)
(3) Project Communication Plans (PD-12)
(4) Memo: *Freight Mobility – ODOT Commitments With The Freight Industry*
(5) Memo: *Dinner Meeting on March 14, 2002*
(6) Memo: *Corridor Delay Thresholds*
(7) Data Needed for Delay Calculations on STIP Projects
(8) Corridor Delay Thresholds: *Questions and Answers*
(9) Delay Category Definitions
(10) Request for Exception to Delay Thresholds: *Outline (Memo Format)*
(11) Request for Exception to Delay Thresholds: *Process Flowchart*

C. MCTD Route Map Information

D. (1) Mobility Considerations Project Checklist *(for Project File)*
(2) MCTD Restriction Notification Form #734-2357

E. Statewide Traffic Mobility Contact Directory

F. Example of an Informal Cost-Benefit Assessment *(Reference Chapters 3 & 4: Vertical & Horizontal Clearances)*

G. Project Level Traffic Management Plan (TMP) Guidelines

H. Program Level Traffic Management Plan (TMP) Guidelines

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