ENGINEERING POLICY BALLOT

Effective: October 1, 2020

Level 2

Level two revisions require the approval of the **Assistant Chief Engineer** and the **Federal Highway Administration** only. The **Senior Management Team** is encouraged to review the content and provide comment to the appropriate director. For all other parties, these revisions are posted for information only.

ENGINEERING POLICY BALLOT

Effective: October 1, 2020

Issue 1: Updating General Provisions for Supplemental Guide Sign Program

Approval: **Level 2 – Assistant Chief Engineer**

Sponsor: Thomas Honich- TS

Summary: This revision will update the antiquated Missouri Logos sign program to the Tourist Oriented Destination Signs (TODS) program. The update provides better guidance for contractors and construction staff, primarily how to pay for existing signs (TODS) within the project limits. The revision will better ensure the TODS are replaced accurately, timely, and at reduce costs (fewer lost signs, etc.). Signs and sign installations are MUTCD compliant.

Fiscal Impact: There is no anticipated fiscal impact associated with this revision.

Publication: General Provisions

Issue 2: Updating Planning Framework for Transportation Decision-Making

Approval: **Level 2 – Assistant Chief Engineer**

Sponsor: Llans Taylor- TP

Summary: This proposed revision was prepared by a quick action team as they reviewed the planning framework and updated it to reflect current practice and rearrange the planning process steps/flow. These changes were provided to the planning partners (MPOs and RPCs) with an opportunity for comment.

Fiscal Impact: There is no anticipated fiscal impact associated with this revision.

Publication: EPG 121.2

Issue 3: Allowing the Removal of State Plane Coordinates from Plan Sheets

Approval: **Level 2 – Assistant Chief Engineer**

Sponsor: Jim Copeland - DE

Summary: The proposed revisions allows the removal of State Plane Coordinates from coordinate plan sheets. This subsequently changes the State Plane Coordinates for reference point plans sheets. Instead, MoDOT Modified State Plane Coordinates (ground coordinates) will be used. This is an exception the State Land Surveyor has provided MoDOT (exception to RSMo 60.431). This will help eliminate confusion contractors are having with the State Plane Coordinates.

Fiscal Impact: There is no anticipated fiscal impact associated with this revision.

Publication: EPG 237.4

Issue 4: Changeable Message Sign (CMS) Requirements

Approval: **Level 2 – Assistant Chief Engineer**

Sponsor: Mark Sommerhauser- KC

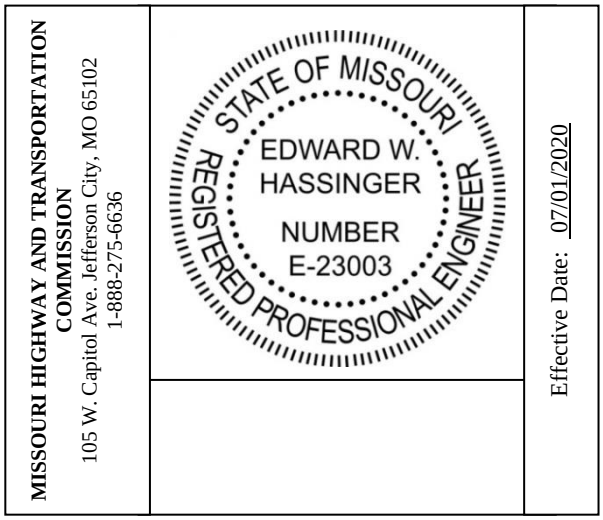
Summary: Members of the TSMO Work Zone Review Team provided proposed revisions for Changeable Message Signs (CMS). Updating Sections 616 and 1063 will better define the requirements for communication integration and other CMS abilities. This will make it easier for contractors to bid the correct CMS in projects.

Fiscal Impact: There is no anticipated fiscal impact associated with this revision.

Publication: Sec. 616 and 1063

CONTENTS

GENERAL PROVISIONS



2.2 The 96 X 48 inch "Point of Presence" sign shall be post mounted on three 3-pound/foot U-channel posts with 32-inch spacing between posts.

3.0 Basis of Payment. The accepted quantity of "Point of Presence" signs will be paid for at the contract unit price per square feet of construction signing. The "Completed as Promised" decal or plaque shall be considered incidental to the "Point of Presence" sign.

~~SERVICE SIGNING~~SUPPLEMENTAL GUIDE SIGNS

1.0 Description. All installation, relocation and repair of Tourist Oriented Destination Signs (TODS), Specific Service Signing (Logos), traffic generator signs (private tourist oriented activity sites, Colleges, State and Federal Agency sites, Welcome Center Affiliate sites and State Correctional Centers)~~Missouri LOGO, Tourist Oriented Destination Signs (TODS) and General Service Signing~~ shall be coordinated between the engineer, contractor and the designated Program Manager for MoDOT's Supplemental Signing Program~~Missouri LOGO representative~~.

1.1 It shall be noted by the contractor that ~~Missouri LOGOS~~the Program Manager is responsible for the installation, relocation and repair of all ~~LOGO,~~ TODS, Logo and ~~General Service~~traffic generator s~~S~~igns on ~~MoDOT~~ Commission owned right of way. The contractor shall be solely responsible and liable for determining any impact to ~~LOGO, TODS or General Service Signing~~these signs due to contractor operations during construction of this contract. The contractor shall be responsible for notifying ~~Missouri LOGOS~~the Program Manager at the time of the preconstruction meeting when one of these signs ~~a service sign~~ is determined to be impacted and advise ~~Missouri LOGOS~~the Program Manager of the project details. The ~~Missouri LOGO representative~~Program Manager ~~-~~will attend these meetings at their discretion~~.~~

~~The Missouri LOGO representative~~ and shall be contacted during normal business hours Monday-Friday at the number provided by the engineer~~24 hours a day, 7 days per week at (573) 291-6788~~.

1.2 ~~Missouri LOGOS~~The Program Manager will be responsible any installation or relocation of ~~service~~ these signs necessary for this contract. If ~~Missouri LOGO's~~the Program Manager has to perform work within the limits of the project, ~~Missouri LOGOS~~the Program Manager will conduct work so as not to interfere with or hinder the progress or completion of the work being performed by the contractor. Full cooperation of the contractors involved, in careful and complete coordination of their respective activities in the area, will be required.

2.0 Basis of Payment. No direct payment will be made to the contractor to recover the cost of equipment, labor, materials or time required to fulfill this provision. The Program Manager shall submit an invoice to the engineer for the work completed, with the costs associated being based on the Supplemental Guide Sign Contract agreed upon pricing. This work is considered non-contractual and will be processed through MoDOT's Financial Services Division.~~-~~

REVISIONS TO 2020 MISSOURI STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION

121.2 The Planning Framework for Transportation Decision-Making

MoDOT is committed to working with local officials, citizens and stakeholders to help determine the right transportation solutions for their communities. MoDOT recognizes that a transparent, inclusive and flexible process produces the best outcomes.

MoDOT includes planning partners, transportation stakeholders and the general public in the process to identify the highest priority needs and improvements statewide and in each district.~~Missouri has significantly more transportation needs than money available. MoDOT works with its planning partners, transportation stakeholders and the general public in deciding the highest priority needs and improvements that should receive available funding.~~

This process, referred to as the Planning Framework, relies on the right people being involved in discussing and evaluating needs and then making decisions on those needs that should move forward for more detailed evaluation as potential projects.~~which ones should move forward.~~

Because Missouri has significantly more transportation needs than funds available, the Planning Framework provides a process to determine which priorities should receive the limited available funding each year.

~~We are committed to working with local officials, citizens and stakeholders to help determine the right transportation solutions for their communities. MoDOT recognizes that a transparent, inclusive and flexible process provides the best results.~~

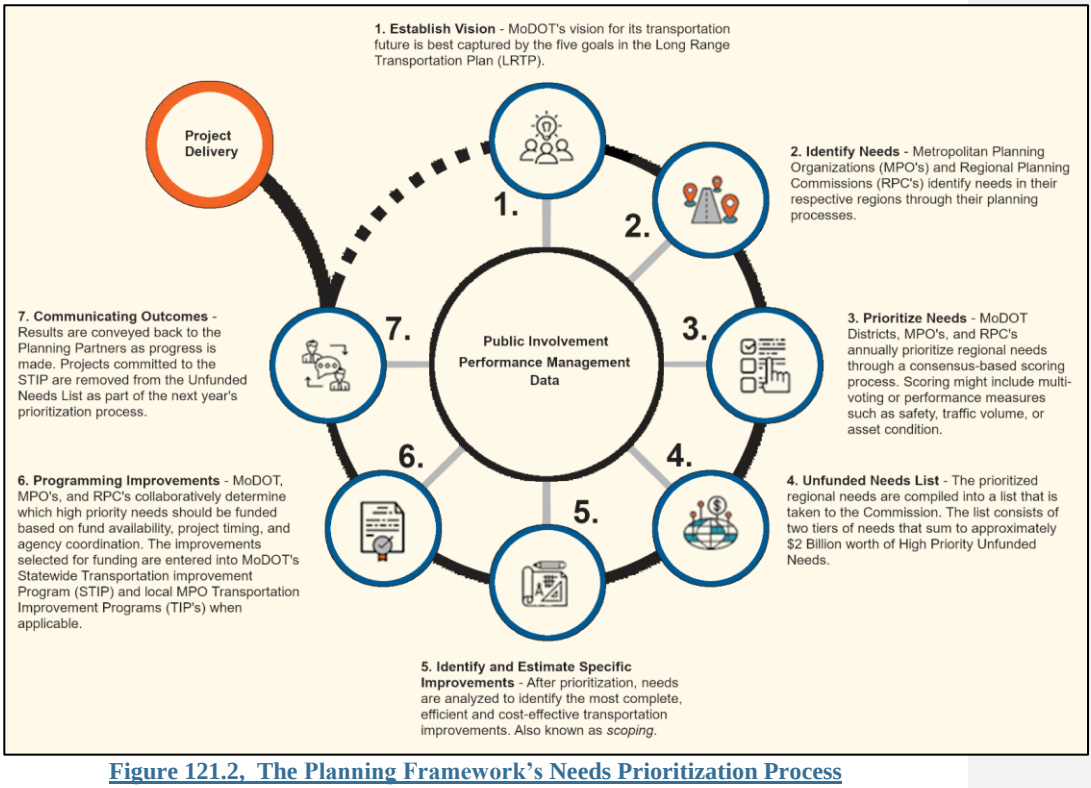
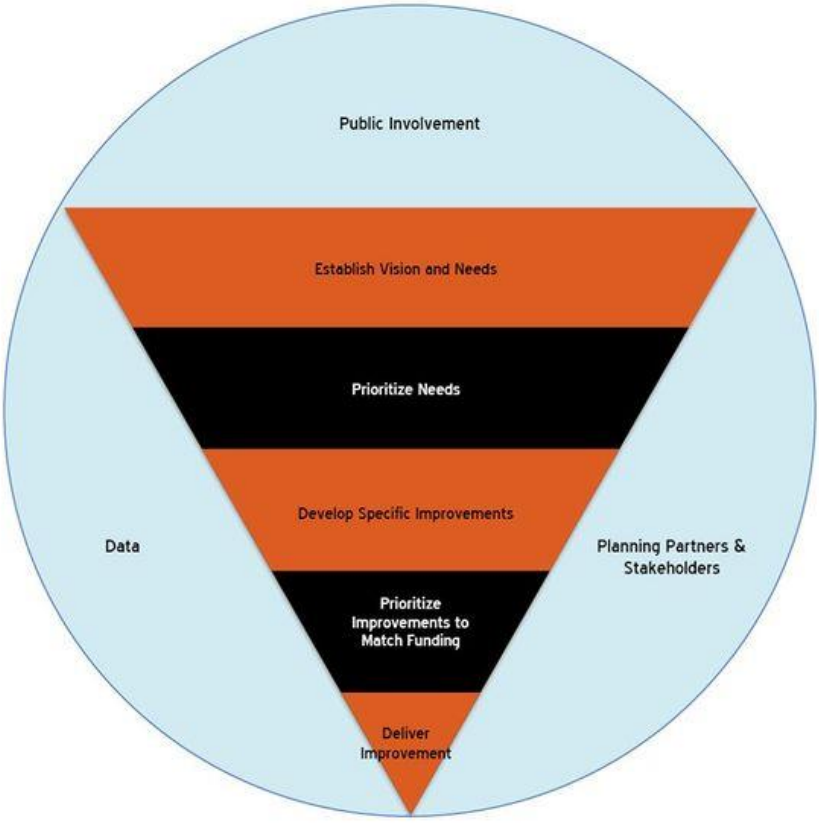


Figure 121.2, The Planning Framework's Needs Prioritization Process



121.2.1 Public Involvement

Missourians have a say in how transportation dollars are spent. The most common way for citizens to be involved is through public meetings that MoDOT, metropolitan planning organizations (MPOs) and regional planning commissions (RPCs) hold throughout the planning and project development processes.

The public may participate in discussing the needs and proposed improvements in their communities during any publicly held meeting by MoDOT, MPO, RPC, City and/or County governmental entity. Outreach methods to engage minority and economically disadvantaged residents, as well as other groups such as the elderly, individuals with disabilities, economic development interests, and historical and environmental groups should also be used.

The public is also invited to make comments regarding proposed projects during the draft Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP) comment periods.

The development of quality transportation improvements depends on early, often and continuous involvement of the public in decisions. Public involvement allows MoDOT to gather real, valid input on transportation needs.

121.2.2~~1~~ Transportation Planning Partners and Stakeholders

MoDOT focuses on involvement by local officials and community leaders within metropolitan planning organizations (MPOs) and regional planning commissions (RPCs).

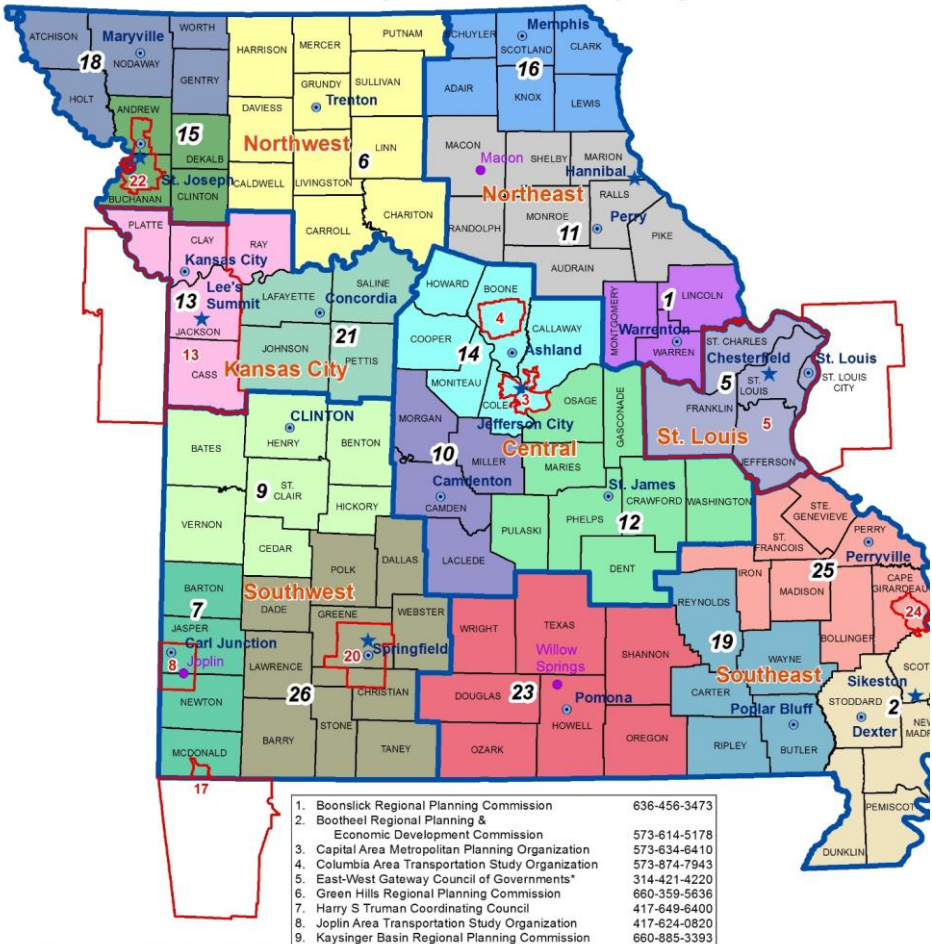
MPO's are created by Federal Statute 23 CFR 450.310 (also view Title 49 USC Chapter 53). MPO's represent urbanized areas with populations of more than 50,000. They are responsible for transportation planning within their areas. The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) shall designate each urbanized area with a population of over 200,000 individuals as a Transportation Management Area (TMA) as defined by the Bureau of the Census.

RPCs are created by Missouri RSMo. 251.150 to 251.440. RPCs represent multi-county rural regions and coordinate with regional local governments in community affairs, including transportation planning.

MoDOT consults with metropolitan and non-metropolitan planning agencies on substantive changes to the Long Range Transportation Plan (LRTP) and other statewide transportation plans and programs as required by 23 CFR 450.120(b).~~ These officials, who are elected by the general public, join to form regional boards of directors of metropolitan planning organizations (MPOs) and regional planning commissions (RPCs). MPOs represent urbanized areas with populations of more than 50,000. They are responsible for transportation planning within their areas. RPCs represent multi-county rural regions and coordinate regional local governments in transportation planning.~~


Missouri Regional Planning Commissions and Metropolitan
Maryville
Trenton
Northwest
St. Joseph
Kansas City
Lee's Summit
Kansas City
Concordia
Memphis
Macon
Hannibal
Northeast
Perry
Warrenton
Ashland
Chesterfield
St. Louis
Jefferson City
Central
Camdenton
St. James
St. Louis
Perryville
Southwest
Carl Junction
Joplin
Springfield
Willow Springs
Pomona
Southeast
Poplar Bluff
Sikeston
Dexter

Missouri Regional Planning Commissions and Metropolitan Planning Organizations



1.	Boonslick Regional Planning Commission	636-456-3473
2.	Bootheel Regional Planning & Economic Development Commission	573-614-5178
3.	Capital Area Metropolitan Planning Organization	573-634-6410
4.	Columbia Area Transportation Study Organization	573-874-7943
5.	East-West Gateway Council of Governments*	314-421-4220
6.	Green Hills Regional Planning Commission	660-359-5636
7.	Harry S Truman Coordinating Council	417-649-6400
8.	Joplin Area Transportation Study Organization	417-624-0820
9.	Kaysinger Basin Regional Planning Commission	660-885-3393
10.	Lake of the Ozarks Council of Local Governments	573-346-5692
11.	Mark Twain Regional Council of Governments	573-565-2203
12.	Meramec Regional Planning Commission	573-265-2993
13.	Mid-America Regional Council*	816-474-4240
14.	Mid-Missouri Regional Planning Commission	573-657-9779
15.	Mo-Kan Regional Council	816-233-3144
16.	Northeast Missouri Regional Planning Commission	660-465-7281
17.	Northwest Arkansas Regional Planning Commission	479-751-7125
18.	Northwest Missouri Regional Council of Governments	660-582-5121
19.	Ozark Foothills Regional Planning Commission	573-785-6402
20.	Ozarks Transportation Organization	417-865-3042
21.	Pioneer Trails Regional Planning Commission	660-463-7934
22.	St. Joseph Area Transportation Study Organization	816-271-4653
23.	South Central Ozark Council of Governments	417-256-4226
24.	Southeast Metropolitan Planning Organization	573-339-6327
25.	Southeast Missouri Regional Planning & Economic Development Commission	573-547-8357
26.	Southwest Missouri Council of Governments	417-836-6900

* = Organizations functioning as both RPC a
(Boundaries for the Mid-America Region
and MPO vary)

MoDOT Districts 1-888-ASK-MODOT (275-6636)

Prepared by
Missouri Department of Transportation
Transportation Planning
www.modot.org

May 11, 2020

MoDOT District
19 Regional Planning Commission
9 Metropolitan Plann Organization
MoDOT District Off
Regional Office
RPC Office

Figure 121.2.2, Missouri's MPOs and RPCs

~~121.2.2 Public Involvement~~ *(revised and moved to EPG 121.2.1)*

~~Missourians have a say in how transportation dollars are spent. The most common way for citizens to be involved is through public meetings that MoDOT, metropolitan planning organizations (MPO) and regional planning commissions (RPC) hold throughout the planning and project development processes. These meetings are held in communities around the state specifically to gather input from the general public. Missourians are also involved by electing the local officials who comprise the RPC and MPO boards of directors and/or through direct contact with MoDOT, MPOs, RPCs or local officials.~~

~~While all the public is invited to participate in our process, particular care is paid to contacting property owners adjacent to the specific solutions, public officials, elected representatives, law enforcement, schools and emergency services regarding needs and proposed improvements. Innovative methods to involve minority and economically disadvantaged sectors of the community, as well as other groups (senior citizens, economic development interests, and historical and environmental groups) are also used.~~

~~The development of quality transportation improvements depends on early, often and continuous involvement of the public in decisions. Public involvement allows MoDOT to gather real, valid input on transportation needs and to work with customers to refine solutions that meet those needs.~~

121.2.3 Data

Missouri has the seventh largest state highway system in the United States. As established by state law, MoDOT is responsible for maintaining Missouri's highway system. That system is comprised of over 10,300 bridges and more than 33,000 miles of highways. Other significant infrastructure components of this vast system include culverts, retaining walls, noise walls, large structural signs, high mast lighting poles and Intelligent Transportation System (ITS) devices along Interstates and other major roadways throughout the system.

As the primary recipient of federal and state funding for transportation, MoDOT is required to comply with established data gathering and reporting requirements and protocols for the entire system. These include the performance measures described in Section 121.2.6 below. On an annual basis, MoDOT must report the condition of its highways and bridges to FHWA through FHWA's Highway Performance Monitoring System and the National Bridge Inventory, respectively. MoDOT is also required to report its use of safety funds and the improvement results gained from the use of these funds.

MoDOT regularly collects a wide array of data and information on its transportation system. From daily traffic operations in Missouri's large urban centers to traffic counts on lesser traveled

roads in non-urban areas of the state, data collection and analysis are integral to MoDOT's operation and maintenance of the system. Data is collected primarily through field inspections. For congestion in the urban areas, data is collected electronically through RITIS and other ITS data gathering technologies. Here is a representative cross-section of data MoDOT regularly collects about the system and its performance. (See EPG 171.11and EPG 145 for a comprehensive listing):

- Highway travel – vehicle miles of travel, including seasonal travel and truck volumes
- Bridge condition – all structural elements
- Pavement and roadside appurtenances condition – subsurface and surface, signs, guardrail, median barriers, end terminals, fences, etc.
- Safety – crash data including roadway geometrics, road surface condition, railroad crossings, sign posts and work zones
- Truck permitting – oversized loads
- Environmental - noise, wetlands, archaeological and cultural, erosion control
- Operations and maintenance – snow, grass and weed control, roadside debris

The main repository for most of this data is MoDOT's Transportation Management System (TMS). Data is analyzed, data sets are created and used by MoDOT staff, it's senior leadership and planning partners to prioritize needs and help shape policy. For example, MPOs rely on traffic and other system condition data as input for regional demand modeling, to set regional long-range transportation goals and for congestion management processes. TMS data can also be produced in graphical format as well as in interactive tools such as DataZone for planning scenario purposes. Data is also used by MoDOT district staff as well as private sector partners (primarily engineering consulting firms, for example) to conduct traffic impact studies, corridor analyses and major environmental studies on MoDOT's behalf. As mentioned previously, MoDOT uses TMS generated data to analyze and set performance benchmarks and for accountability reporting. For example, MoDOT's performance Tracker is an accountability tool used throughout MoDOT and available to the public. On a quarterly basis, MoDOT staff and senior leadership report on an array of performance measures provided through Tracker. MoDOT also uses TMS and other data to monitor trends for accountability reporting and for strategic initiatives and continuous improvement processes - as reported in FOCUS. Information is regularly shared with planning partners, providing critical information not just for their planning and needs prioritization processes but for their own performance-based reporting purposes.

For modeling and other specialized needs, electronic databases, GIS files, spreadsheets, customized reports and interactive maps are made available to planning partners upon their request.

~~The Planning Framework is a mix of objective and subjective data and criteria used to help prioritize regional needs. The objective data can include items like traffic volumes, accident statistics, travel times and condition reports for the transportation system. Subjective data can~~

~~include local safety concerns, local perceptions for economic development opportunities, cost and resource sharing and other items.~~

121.2.4 Performance Management

The Moving Ahead for Progress in the 21st Century (MAP-21) Act, enacted in 2012, emphasized performance management within the Federal-aid highway program and transit programs and required use of performance-based approaches to statewide, metropolitan, and nonmetropolitan transportation planning. The Fixing America's Surface Transportation (FAST) Act, enacted in 2015, reaffirmed the requirements established by MAP-21.

Transportation Performance Management (TPM) is a strategic approach that uses system information to make investment and policy decisions to achieve national performance goals.

It includes seven national Federal highway program performance goals as established by Congress:

- Safety - To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- Infrastructure Condition - To maintain the highway infrastructure asset system in a state of good repair
- Congestion Reduction - To achieve a significant reduction in congestion on the National Highway System
- System Reliability - To improve the efficiency of the surface transportation system
- Freight Movement and Economic Vitality - To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.

TPM also includes new Federal Transit Administration (FTA) requirements of States, MPOs and transit agencies.

Figure 121.2.4.1: Six Elements of TPM Roles and Responsibilities

- USDOT

  - Performance Measure Rules include:
    - Establish measures; identify data sources; define metrics
    - Report to Congress
    - Stewardship and oversight
- States, MPOs and transit agencies
  - Establish targets
  - Support national goals in the planning process and consider measures and targets in plans and programs
  - Report progress to USDOT (States and transit agencies)

Performance-based planning and programming (PBPP) refers to the application of performance management within the planning and programming processes of transportation agencies to achieve desired performance outcomes for the multimodal transportation system. This includes a range of activities and products undertaken by a transportation agency together with other agencies, stakeholders, and the public as part of a 3C (cooperative, continuing and comprehensive) process. It includes development of: long range transportation plans (LRTPs), other plans and processes (including those Federally-required, such as Strategic Highway Safety Plans, Asset Management Plans, the Congestion Management Process, Transit Agency Asset Management Plans and Transit Agency Safety Plans, as well as others that are not required), and programming documents, including State and metropolitan Transportation Improvement Programs (STIPs and TIPs). PBPP attempts to ensure that transportation investment decisions are made – both in long-term planning and short-term programming of projects – based on their ability to meet established goals.

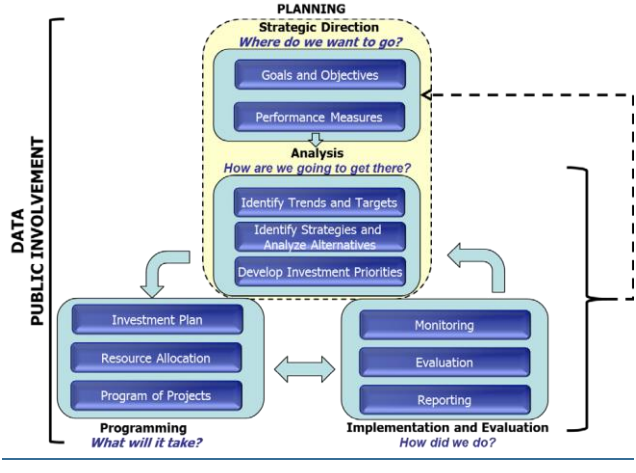


Figure 121.2.4.2: How PBPP Stages Fit Within a Traditional Planning and Programming Process

MPOs must ensure the new TPM requirements are met based on the final rules established by USDOT. Details on these requirements are available in the links below:

- FHWA TPM
- FHWA Planning
- National Highway Institute courses
- National Transit Institute courses
- AASHTO TPM Timeline Tool

In an effort to ensure outstanding communication and collaboration on performance management with our planning partners, MoDOT holds a monthly MAP-21/FAST Act performance management webinar. In addition to the Missouri MPOs, MoDOT invites DOT representatives from the States that share MPOs with Missouri, regional staff from the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), FHWA and FTA staff from neighboring states and the regional planning commissions. The webinars serve to ensure continued education on performance management and to advise all parties of upcoming deadlines and requirements.

121.2.5 Establish Vision

Missouri's vision for its transportation future is best articulated by the five goals in MoDOT's LRTP namely:

- Take care of the existing transportation system
- Provide for the safety of all users of the system regardless of the mode of travel
- Make investments in the system that spur economic growth and development
- Provide better transportation choices, and
- Improve the reliability of the system and reduce congestion on the system.

These goals, in turn, are guided by MoDOT's mission; and they are actualized in a manner consistent with MoDOT's values.

The vision is defined and set, collaboratively, by MoDOT and a host of partners and stakeholders from across the state. Partners and stakeholders include the State's 23 MPOs and RPCs, special interest groups and engaged citizens, all of whom participate in this open and transparent process of vision setting. Thus, the statewide LRTP reflects the goals Missourians have said are important to them.

Building upon this foundation, MoDOT has produced several other important documents to help translate Missouri's transportation vision into actionable results. These include:

- Missouri's Strategic Highway Safety Plan - establishes statewide safety goals and guidelines for using Safety funds and is intended to be used by all traffic safety advocates in their respective communities.

- The Citizens Guide to Transportation Funding in Missouri - explains how MoDOT is funded, the sources and amounts of its funding, and how and where these investments are made

Perhaps the two most important documents for producing actionable results are MoDOT's Asset Management Plan (AMP) and its Statewide Transportation Improvement Program (STIP). The AMP quantifies asset management needs across the system and their associated costs. Goals are established for the three major asset types – pavements, bridges and mobility. It is both a strategic and tactical plan in that it identifies specific types of work, bridge square footage, lane miles, treatments etc. In essence, it is a ten-year plan for keeping Missouri's infrastructure assets in good condition.

Each district is required to develop an AMP. District plans must clearly define how, given the limited funding available to them, they intend to meet established system condition goals for assets types or categories. These plans must also include the districts' strategy for meeting their ADA Transition Plan commitments by 2027 (See Tracker Measure 5G).

The STIP is MoDOT's rolling five-year investment program. It is MoDOT's tangible commitment, to the citizens of Missouri, for how it will maintain the system in good condition. The STIP lists all projects to be worked on during a given five-year period within each of MoDOT's seven geographic districts. The STIP provides specific project descriptions, project estimates and project schedules. It is approved annually by the Missouri Highways and Transportation Commission. Both the AMP and STIP are updated annually.

Both of the aforementioned MPOs and RPCs were established by federal and state law, respectively. They were created to help communities and regions set vision and goals for themselves. MPOs were established by federal law more than 50 years ago. Missouri's Regional Planning Commissions were established by the Regional Planning and Community Development Act of 1965.

MPOs are responsible for developing long-term transportation plans (which typically cover a 20-year time period) called Metropolitan Transportation Plans (MTPs) or regional long-range transportation plans (LRTPs), which identify the needs and aspirations of the communities they represent. They also develop shorter (typically three- to four- year) Transportation Improvement Plans (TIPs) for their respective geographic areas, which identify the specific projects which are planned throughout the region.

RPCs are composed of locally elected officials, city and county staff, MoDOT representatives, and citizens – many of whom may have an interest in transportation issues if not a background in transportation itself. These organizations are structured to include a board of directors and technical advisory or other standing committees that facilitate the prioritization of needs. Daily operations, including work tasks are carried out by technical and professional staff of these organizations. As previously mentioned, these organizations collaborate with MoDOT to help establish Missouri's transportation vison.

121.2.6 Identify Needs

MoDOT identifies transportation system needs through the framework of the LRTP process. However, to satisfy federal and other requirements, MoDOT also performs or conducts systematic inspections to monitoring and evaluating system condition. The results are used to better evaluate and prioritize needs. Through their own local and regional collaborative planning processes, MPOs and RPCs also play significant roles in identifying needs; and they work, collaboratively with MoDOT's seven district offices to prioritize needs.

MoDOT uses its knowledge of the existing system to determine needs that develop throughout the system. Each district uses its pavement, bridge, maintenance, traffic and safety experts to regularly gather system condition and performance information, analyze that information, and to both quantify and clarify needs based on data collected for the system. Additionally, data may be collected through studies or field investigations conducted by MoDOT. The aim is to identify and define corridor- or roadway-specific problems and improvement needs. Identifying, analyzing, and quantifying needs are routine system performance monitoring practices conducted by MoDOT.

Transportation planning, including identifying and prioritizing needs, in the state's nine urban areas, are the responsibility of MPOs. MPOs are required, by law, to carry out three major planning functions: development of a long-range plan; development and management of a TIP - generally covering four years; and a Unified Planning Work Program - which lays out the annual tasks and activities of the MPO's staff. MPO staff work collaboratively with MoDOT districts on each of these major areas of responsibility.

For long-range planning, MoDOT provides data, takes part in the MPO's prioritization process and develops cost estimates for needs that have been prioritized for inclusion into the plan. MoDOT also inform the plan's development by providing critical information from the analysis and outcomes of its annual Asset Management planning efforts. A more in-depth description of what MoDOT contributes to the regional planning process is presented in Section 121.2.4, Data.

In the non-urban, or rural areas, transportation planning and needs identification are done in collaboration with the state's RPCs. Each RPC has a Transportation Advisory Committee (TAC) which meets on a regular basis to discuss transportation issues and identify needs within their respective areas. These TACs are comprised of elected officials, city and county staff, and MoDOT representatives.

Transportation needs in the rural areas are identified and provided to the TAC for discussion, consideration and prioritization. The needs are identified through transportation concerns provided by state, county, and city public officials, and citizens who contact their local officials. MoDOT also provides pavement, bridge, and safety data to the TACs to help support or establish the transportation needs. All needs presented to the TAC are documented, and then prioritized for future funding and programming in the STIP.

~~121.2.4 Establish Vision and Identify Needs~~

~~MoDOT, MPOs, RPCs, public officials, special interest groups and citizens set and refine Missouri's transportation vision in the Long-Range Transportation Planning process (LRTP). The vision is Missouri's ideal transportation system based on feedback from Missourians. The LRTP process provides information, guidance and direction to MoDOT and its planning partners and stakeholders to help identify the needs and determine where Missouri's transportation dollars should be spent.~~

~~In addition to the statewide LRTP, MPOs develop regional LRTPs that include policy development, fiscally constrained needs identification, public involvement and conformity with air quality regulations. In general, items in MPO and state LRTPs are consistent. Resources will be allocated to the needs and projects agreed upon by both the MPO and MoDOT.~~

~~Once a draft LRTP is developed and presented to the Missouri Highways and Transportation Commission (MHTC), MoDOT accepts public comments during a 30-day period prior to submission of a final LRTP for approval by the MHTC.~~

121.2.75 ~~5~~ Prioritize Needs

Transportation needs are prioritized in each region. Statewide, this prioritization effort works in concert with the goals of MoDOT's LRTP. The prioritization efforts within individual MPOs also reflect the goals of their MTPs or LRTPs. MoDOT districts and planning partners work together to annually identify, discuss and then prioritize each region's needs. Each region has the flexibility to prioritize their needs using a method they have agreed upon. Examples include, but are not limited to:

- Scoring needs against performance measures; such as safety, congestion, traffic volume, condition, etc.
- Multi-voting
- Ranking needs high, medium, low and then assigning points to each category to end up with a prioritized list.

~~Needs prioritization is based on the goals in Missouri's LRTP. MoDOT districts and planning partners annually prioritize regional needs. Many regions divide the needs into three categories:~~

- ~~High Priority – Resources address these needs first by selecting them to develop/design specific solutions.~~
- ~~Medium Priority – These needs may be addressed as additional resources become available.~~
- ~~Low Priority – No work for these needs at this time.~~

Each time needs are prioritized, the previously identified~~existing~~ needs will be re-evaluated. Some high priority needs may never be designed or constructed due to prohibitive costs, changing priorities or for other valid reasons.

121.2.8 High Priority Unfunded Needs List

MoDOT maintains a list of high priority unfunded needs. This list is used to demonstrate the identified needs around the state and includes roadway and bridge projects estimated at approximately $2 billion over both Tier 1 and Tier 2 and approximately $300 million in prioritized multimodal needs.

Through the planning process, MoDOT staff work with the planning partners to identify and prioritize regional needs. These prioritized regional needs include both roadway and bridge items as well as multimodal needs. Each region provides their prioritized needs to the district. The district will add the appropriate needs to the unfunded needs list. The prioritization process is intentionally flexible in order to allow each district and region the ability to adopt a process that functions adequately and can be molded to their desired approach.

Since the unfunded needs list is intended to represent just a portion of the needs in a region, the overall list for roadway and bridge needs and multimodal needs, is constrained to approximately $2 billion and $300 million respectively. The total value of the associated scoping estimates for all listed needs in each region correlates to each district's distribution formula for both categories of work, road and bridge and multimodal. For example, if a district receives 10% of distributed funds, the total value of all projects included in tier 1 and tier 2 roadway and bridge needs would be approximately $50 million for tier 1 and $150 million for tier 2. Similarly, if a district receives 10% of distributed funds, the total value of all projects included in their multimodal need's identification would be approximately $30 million.

Additional specific guidance on the unfunded needs list targets is provided to the Districts prior to the start of the effort to develop the lists. The high priority unfunded needs list process starts once the draft STIP is created and it is finalized in the fall of each year to be taken to the Commission, usually around November.

121.2.9 Identify and Estimate Specific Improvements

~~121.2.6 Develop Specific Improvements~~

The scoping process for specific improvements to address a need begins after all needs are prioritized. During this process, needs are analyzed to identify efficient and cost-effective transportation improvements. This process ~~The developing, or scoping, process analyzes transportation needs and selects the best overall transportation improvements. It~~ involves:

- Determining the root causes of the transportation problem, issue or concern;
- Developing a range of possible improvements;
- Reviewing the social, economic, energy and environmental and other pertinent impacts;
- Evaluating, estimating, ~~-~~and choosing the best improvement;
- Setting the improvement's physical limits;
- Accurately estimating the preferred improvement's cost for programming; and

- Forecasting the improvement's delivery schedule.

The scoping process helps determine the most complete, cost-effective improvements early in project development. Public involvement in defining the needs and determining the appropriate improvement can take several forms. The public may actually initiate the investigation of needs by contacting MoDOT or its other planning partners. The public, through local officials, is represented in the scoping process. After viable improvements have been identified ~~for high-priority needs~~, the needs move on to the improvement prioritization process as allowed by available funding.

~~121.2.7 Prioritize Improvements to Match Available Funding~~

~~Annually, MoDOT works with its planning partners to establish a prioritized list of transportation improvements, using a prioritization process determined by each region. The improvement prioritization is fiscally constrained based on each region's available funding.~~

~~Each time improvements are prioritized; existing improvements not yet scheduled for delivery will be re-evaluated. Some high priority improvements may never be delivered due to prohibitive costs, changing priorities or other reasons. If MoDOT and its planning partners unanimously agree that an improvement no longer addresses a valid need, it will be removed from the priority list, freeing resources for other improvements.~~

~~121.2.8 Deliver Improvements~~

~~MoDOT, MPOs and RPCs determine which high priority transportation improvements should be funded. The improvements that are selected for funding are included in MoDOT's five-year Statewide Transportation Improvement Program (STIP), and also in each MPO's Transportation Improvement Programs (TIPs), where applicable. The STIP and TIPs set forth the specific transportation system improvements that will be completed during a four- to five-year period. STIPs and TIPs are rolling plans; as one year is completed, another year is added.~~

~~Each year, the Draft STIP is presented to the MHTC in May, followed by a 30-day public comment period. A final STIP is taken to the MHTC for approval each July.~~

~~Once an improvement is added to MoDOT's STIP, it is a commitment and will be delivered.~~

~~121.2.9 Consultation with Non-Metropolitan Planning Agencies and Local Officials~~

~~Regulations require the state to provide for non-metropolitan local official participation in the development of the long-range transportation plan (LRTP) and the statewide transportation improvement program (STIP), and to develop a documented process for consulting with non-metropolitan local officials.~~

~~MoDOT consults with metropolitan and non-metropolitan planning agencies on substantive changes to the LRTP and other statewide transportation plans and programs as required by 23 CFR 450.120(b).~~

121.2.10 Programming Improvements

The available funding for transportation system improvements is detailed in the Citizen's Guide to Transportation Funding in Missouri. The adopted funding distribution formula outlines the allocation of construction funds to each of the MoDOT districts. This formula is updated and adopted by the Commission.

MoDOT, MPOs and RPCs determine which high priority transportation needs should be funded for improvements. Project selection considers not only the priority list, but also the amounts of available funding and type of funding available (fiscal constraint), project timing and coordination with other projects, and opportunities to obtain funding from other sources, such as federal discretionary funding or cost sharing with another agency or entity. The improvements that are selected for funding are included in MoDOT's five-year Statewide Transportation Improvement Program (STIP), and also in each MPO's Transportation Improvement Programs (TIPs), where applicable. The STIP and TIPs set forth the specific transportation system improvements that will be completed during a four- to five-year period. The STIP and TIPs are rolling plans; as one year is completed, another year is added. MoDOT's STIP aligns with the state's fiscal year (SFY), which begins on July 1st and ends on June 30th of the following calendar year. MPO TIPs may use the state's fiscal year, or the federal fiscal year (FFY), which begins on October 1, and end on September 30th of the following calendar year, or an alternative cycle, although following the state or federal fiscal year is preferred.

Each year, the Draft STIP is presented to the MHTC in May, followed by a 30-day public comment period. A final STIP is taken to the MHTC for approval each July.

Once an improvement is added to MoDOT's STIP, it is a commitment and it will be delivered.

121.2.11 Communicating Outcomes

The fundamental purpose of the planning framework includes communicating needs and priorities, providing opportunities for input and providing guidance in the project planning and development process. It is therefore critical that communication continues throughout the process and results are conveyed back to the planning partners as progress is made.

Whether a project is identified through a region's traditional prioritization process or is included on the High Priority Unfunded Needs list, the associated outcome for each applicable identified need should be communicated to the planning partners.

Projects committed to the STIP at the annual update would be removed from the high priority unfunded needs list as part of the subsequent district needs prioritization effort. At that time, the

district's high priority unfunded needs should be re-evaluated, and changes made if or when necessary.

~~121.2.10 Partner Satisfaction Survey~~ *(moved to EPG 121.2.13)*

~~MoDOT conducts an annual partner survey to collect satisfaction data from transportation planning partners. These surveys are sent across the state including but not limited to MPO, RPC, elected officials and municipal employees. MoDOT encourages its planning partners to give open and honest feedback in order to find ways to continually improve partnerships and processes. The results of the survey are compiled into a comprehensive report that measures the overall satisfaction and feedback received from all survey respondents.~~

~~The survey, administered online, is open for a 30-day period.~~

121.2.12 Outreach and Engagement Communication efforts

121.2.12.1 Engage the Traditionally Underserved

~~Limited transportation access, childcare necessities, work schedules and language barriers are just some of the hurdles that keep traditionally underserved populations from attending workshops and focus groups.~~

MoDOT plans to provide meaningful public involvement opportunities to traditionally underserved ~~minority and low-income~~ populations.

Effective strategies to ensure that all communities are engaged and understand how the planning processes are relevant to them, must be used. These would include those strategies aimed at traditionally underserved or underrepresented communities including: actively engaging members at community gathering places; advertising in non-traditional media; providing outreach materials at transit facilities; providing diverse kinds of communication formats; and communicating through trusted community leaders. Additionally, consideration should be given to any available opportunities for partnership with organizations whose primary focus is working with underserved populations that could potentially enhance the outreach and engagement effort.~~aimed at minority and low-income communities include actively engaging members at community gathering places, advertising in ethnic media, providing outreach materials at transit facilities and communicating through trusted community leaders.~~

~~In all cases, we must clearly show how the LRTP and the STIP are relevant to minorities and low-income populations.~~

~~Another approach toward reaching traditionally underserved groups is to build upon existing MoDOT outreach efforts.~~

121.2.12.2 Use Diverse Outreach Tools

MoDOT recognizes the importance of reaching~~that to reach~~ a broad spectrum of the public and that doing so requires~~, we must employ~~ a wide range of outreach techniques.

~~The public outreach toolbox detailed here, lists some of the many tools that we have used to engage the public.~~

~~In addition to these tools, on an as-needed basis, we also will provide language assistance to participants whose first language is other than English, provide documents in alternate formats to those with sensory disabilities, and provide disability assistance at workshops/public meetings.~~

~~We also strive to make workshops and focus groups as open to as many people as possible by choosing easily accessible locations and accommodating nontraditional work schedules~~.

~~**Public Outreach Toolbox**~~

- ~~Dynamic website~~
- ~~Email blasts~~
- ~~Social media~~
- ~~Focus Groups~~
- ~~Regional Workshops~~
- ~~Stakeholder and community group presentations~~
- ~~Connecting with trusted community leaders~~
- ~~Mainstream and ethnic media outreach~~
- ~~Newsletters~~
- ~~Surveys~~
- ~~Online Public Meetings~~

The following techniques and tools are potential outreach methods that may be used during public outreach and participation efforts. Many of these tools can be customized (or provisions made) to allow those with visual, hearing or other disabilities to participate in the public outreach efforts.

- Websites
- Mainstream and non-traditional media outreach (including non-English or ethnic focused)
- Email Groups
- Focus Groups
- Comprehensive Database of Stakeholder Groups
- Printed Materials and other Media
- Presentation to Local or Statewide Stakeholder Groups
- Connecting with trusted community leaders
- Regional Workshops
- Additional Tools

    o Podcasting

    o Webcasting

o Blogging

o Web-posted videos

o Social Media

o Newsletters

o Surveys

o Online Public Meetings.~~the LRTP and STIP public participation process. Actual outreach methods for a particular LRTP and STIP public involvement activity will be determined based on available resources, time constraints and applicability. As the public engagement process progresses, a schedule of public participation activities will be posted on the MoDOT website.~~

Selected methods for specific planning activities should be based on available resources, time constraints and applicability. As the digital divide can also be a barrier to access, consideration should be given to using multiple approaches which cover a broad spectrum of accessibility. As the public engagement process progresses, a schedule of public participation activities will be posted on the planning partner's websites.

Outreach efforts should consider including language assistance to participants whose first language is not English, providing documents in alternate formats to those with sensory disabilities, and provide disability assistance at workshops/public meetings. These strategies might include sign language interpretation, large print document version, non-English interpretation or other approaches which can improve engagement and information sharing. Workshops, meetings and focus groups should be open to as many people as possible by choosing easily accessible locations and accommodating nontraditional work schedules.

~~**Website**~~

~~We have found that a high-quality presence on the MoDOT website is a popular repository for LRTP and STIP-related information. A high-quality design helps generate interest in statewide engagement efforts. The following features should be considered for inclusion:~~

~~User-friendly and attractive~~

~~A Frequently Asked Questions (FAQ) page~~

~~Information on statewide, regional and local transportation planning and how they all fit together~~

~~Public comment forms, with responses delivered in a timely manner~~

~~Timelines~~

~~Next steps~~

~~Signup forms for further information and updates via email~~

~~408 compliant~~

~~The offer of an alternative format (for instance, a printed and mailed version of the website material)~~

~~Videos~~

~~Social networking tools~~

~~Surveys~~

~~Focus Groups~~

~~Stakeholder and general public focus groups are an effective method for gathering attitudes, opinions and ideas to help formulate transportation policies and plans. Focus groups can be established by affiliation, ethnicity, income, mode of travel, age group, traveling conditions and other specific categories.~~

~~Comprehensive Database of Stakeholder Groups~~

~~For ease in updating, a stakeholder database will be focused on statewide or district-level groups, whenever possible. Using this strategy leverages the power of the Internet by creating a "web-tree" of partner organizations that are willing to pass along information and invitations to comment on the LRTP and STIP to their constituencies. Because it is often difficult to get the attention and comments from those who are traditionally underserved, such as minority and low-income groups, special efforts should be made to include a broad and diverse set of community-based organizations serving those populations.~~

~~Printed Materials and other Media~~

~~While web-based communication and social media have become commonplace, other media still holds a valuable role in public engagement. News releases, flyers and postcards can be used to publicize the public participation website, important planning milestones, workshops, etc. News releases can be widely distributed through newspaper ads, public notices, radio and television. Ethnic media provides an excellent forum for reaching those traditionally underserved in the planning process.~~

~~Presentation to Local or Statewide Stakeholder Groups~~

~~For some groups, especially community-based and advocacy groups, presenting at established meetings is the best outreach approach.~~

~~Innovative Outreach~~

~~Web-based technology has opened up a whole new range of techniques for reaching out to a large and geographically dispersed population. This is especially important to the LRTP and STIP outreach activities, because these programs face the challenge of engaging the public and stakeholder groups throughout the state. Podcasting, webcasting, blogging and web-posted videos are a few of the techniques that may be employed to channel the power of technology to reach a broad and diverse audience.~~

121.2.13 Partner Satisfaction Survey

MoDOT has an annual partner survey independently conducted to collect satisfaction data from transportation planning partners. This survey is sent across the state including but not limited to MPOs, RPCs, elected officials and municipal employees. MoDOT encourages its planning partners to give open and honest feedback to find ways to continually improve partnerships and processes. The results of the survey are compiled into a comprehensive report that measures the overall satisfaction and feedback received from all survey respondents.

The survey results are used to evaluate the performance and the effectiveness of the partnership with our planning partners and to determine opportunities to improve MoDOT's outreach and coordination efforts.

237.4.8 Referenced Points Sheet

The referenced points for the surveyed alignment are indicated on a separate sheet for use by Construction and Materials in re-establishing the location. Referenced points sheets are available as a MicroStation seed file on CADD. The referenced points are shown on a single sheet, if possible.

It is common for MoDOT Modified Coordinates (ground coordinates) should to be placed on the Referenced Points Sheet. but it is to be indicated on the sheet if they are MoDOT Modified Coordinates or Missouri State Plane Coordinates are shown, along with the projection factor for the project. then a note needs to be added to the sheet identifying the coordinate as state plane.

237.4.9 Coordinate Point~~s~~ Sheet

In order to aid in the re-establishment of the alignment for a project, a listing of significant alignment and control points with their MoDOT ~~1983 Missouri~~Modified State Plane Coordinates (ground coordinates) are included in the plans on the ~~Missouri~~ Coordinate Point Sheet. A blank form is available as a MicroStation seed file. This listing includes the sheet number, station, location, offset, ~~point ID,~~ northing coordinate, easting coordinate,~~, and~~ description of the significant points, and GPK point ID. The coordinates for the points are shown in feet to two decimal places (three decimals places for metric projects~~), but~~) but may be shown with up to five decimal places.

The points listed include the following:

- Beginning and ending station coordinates of project.
- Alignment points (POTs, PIs, Curves [PC, CC, PT], and Spiral Curves [TS, SC, Overall PI, CS, ST]).
- Major centerline intersections (e.g. state routes, major side road approaches, ramp intersections, outer roads, etc.).
- Survey Control Points used by Survey Crews.
- Other significant points unique to the project.

This sheet is used on all projects that have MoDOT Modified State Plane Coordinates~~state plane coordinates~~. This sheet is not used on projects that have independent grid coordinates. The State Land Surveyor gave MoDOT exceptions to RSMo 60.431 so that MoDOT may publish coordinates in US Survey Feet and using MoDOT Modified State Plane Coordinates if the Coordinate Point Sheet clearly identifies them as such and provides the conversion factor to calculate State Plan Coordinates in Meters.

~~The~~ All coordinates listed are MoDOT Modified State Plane Coordinates (ground coordinates)~~state plane coordinates~~. This is to eliminate the confusion some contactors are having with State Plane Coordinates. ~~-~~The average ~~projection~~ grid factor used for the computation of the coordinates for the project is included on the sheet. ~~This factor is furnished by Photogrammetry. It is shown in the form of a multiplier of the state plane distances to obtain ground distances.~~ The station~~s and~~, offset distances, and coordinates shown on this sheet are ground distances. The point ID is the point number or name used in the computations.

The coordinate point sheet contains the historical data for the alignment information for the project and is a permanent part of the plans.

ALL PROJECT COORDINATES HAVE BEEN PROJECTED FROM THE MISSOURI STATE PLANE COORDINATE (SPC) SYSTEM OF 1983 USING AN AVERAGE PROJECT PROJECTION (GRID TO GROUND) FACTOR. TO GET BACK TO STATE PLANE COORDINATES, MULTIPLY THE PROJECT COORDINATES BY THE AVERAGE GRID FACTOR AS SHOWN IN THE "REFERENCE CONTROL INFORMATION" PORTION OF THIS TABLE.

PROJECT COORDINATE INFORMATION

COORDINATE SYSTEM	
HORIZONTAL DATUM	
VERTICAL DATUM	
GEOID MODEL	
ELEVATIONS DETERMINED BY	
PROJECT PROJECTION FACTOR	

REFERENCE CONTROL INFORMATION

COORDINATE SYSTEM	
CONTROL STATION	
DESIGNATION	
CORS_ID	
PID	
LATITUDE	
LONGITUDE	
NORTHING (M)	
EASTING (M)	
ZONE	
PROJECT AVERAGE GRID FACTOR	

EXAMPLE OF PROJECT COORDINATE TO S.P.C.

PROJECT NORTHING X AVERAGE GRID FACTOR
= STATE PLANE NORTHING
PROJECT EASTING X AVERAGE GRID FACTOR
= STATE PLANE EASTING

EXAMPLE: CONTROL POINT #___
N ______.____ X _.________ = N ______.___
E _______.____ X _.________ = E _______.___

LINEAR UNIT CONVERSION

1 METER = 3.280833333 US SURVEY FEET (USFT)

COORDINATE POINT LISTING

SHEET NO	STATION	LOCATION	OFFSET (USFT)	MODIFIED STATE PLANE (GROUND) NORTHING (USFT)	EASTING (USFT)	ELEVATION (USFT)	DESCRIPTION	GPK POINT ID
PROJECT CONTROL POINTS								
ALIGNMENTS (Sugested Title)								

"THIS MEDIA SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT."

DATE PREPARED 6/9/2020	
ROUTE	STATE MO
DISTRICT	SHEET NO.
COUNTY	
JOB NO.	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO.	

DESCRIPTION	DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

Coordinated Point Sheet
Sheet of

ALL PROJECT COORDINATES HAVE BEEN PROJECTED FROM THE MISSOURI STATE PLANE COORDINATE (SPC) SYSTEM OF 1983 USING AN AVERAGE PROJECT PROJECTION (GRID TO GROUND) FACTOR. TO GET BACK TO STATE PLANE COORDINATES, MULTIPLY THE PROJECT COORDINATES BY THE AVERAGE GRID FACTOR AS SHOWN IN THE "REFERENCE CONTROL INFORMATION" PORTION OF THIS TABLE.

PROJECT COORDINATE INFORMATION

COORDINATE SYSTEM	MODIFIED STATE PLANE(GROUND)
HORIZONTAL DATUM	NAD 83(2011) EPOCH 2010.0
VERTICAL DATUM	NAVD 88; GNSS DERIVED
GEOID MODEL	GEOID18
ELEVATIONS DETERMINED BY	DIFFERENTIAL LEVELING
PROJECT PROJECTION FACTOR	1.0000986

REFERENCE CONTROL INFORMATION

COORDINATE SYSTEM	MO COORDINATE SYSTEM OF 1983
CONTROL STATION	MISSOURI CORS
DESIGNATION	MODOT ELDON CORS ARP
CORS_ID	MOEL
PID	DL6153
LATITUDE	38°20'49.67807"(N)
LONGITUDE	092°35'43.33476"(W)
NORTHING (M)	278965.623
EASTING (M)	491663.545
ZONE	CENTRAL
PROJECT AVERAGE GRID FACTOR	0.99990141

EXAMPLE OF PROJECT COORDINATE TO S.P.C.

PROJECT NORTHING X AVERAGE GRID FACTOR
= STATE PLANE NORTHING
PROJECT EASTING X AVERAGE GRID FACTOR
= STATE PLANE EASTING

EXAMPLE: CONTROL POINT #500
N 867507.6178 X 0.99990141 = N 867422.090
E 1605165.2390 X 0.99990141 = E 1605006.985

LINEAR UNIT CONVERSION

1 METER = 3.280833333 US SURVEY FEET (USFT)

COORDINATE POINT LISTING

SHEET NO	STATION	LOCATION	OFFSET (USFT)	MODIFIED STATE PLANE (GROUND) NORTHING (USFT)	EASTING (USFT)	ELEVATION (USFT)	DESCRIPTION	GPK POINT ID
PROJECT CONTROL POINTS								
8	608+30.35	RT	66.80	867507.6178	1605165.2390	785.35	5/8" ROD W/ CAP, STAMPED "CONTROL POINT"	500
9	623+68.37	LT	14.73	866467.0542	1606291.1710	803.51	5/8" ROD W/ CAP, STAMPED "CONTROL POINT"	501
10	631+57.32	RT	69.07	866027.9599	1606951.2400	793.59	5/8" ROD W/ CAP, STAMPED "CONTROL POINT"	502
7	588+16.12	RT	96.02	869341.8857	1604296.1200	757.24	5/8" ROD W/ CAP, STAMPED "CONTROL POINT"	503
8	614+12.72	RT	624.72	866674.9827	1605081.6000	808.82	5/8" ROD W/ CAP, STAMPED "CONTROL POINT"	504
8	603+13.97	RT	917.81	867443.9145	1604171.3450	808.15	5/8" ROD W/ CAP, STAMPED "CONTROL POINT"	505
ALIGNMENTS (Sugested Title)								
	0+00.00		0.00	866158.57228	1605375.11198	0.00	BEGINNING OF EXISTING CENTERLINE CHAIN	EXWILMORE1
	1+23.59		0.00	866208.49585	1605262.05580	0.00	P.C.	CURVE EXWILMORE_3
	1+76.99		0.00	866230.06824	1605213.20329	0.00	P.I.	CURVE EXWILMORE_3
	2+27.23		0.00	866220.56461	1605160.65221	0.00	P.T.	CURVE EXWILMORE_3
	2+74.36		0.00	866212.18472	1605114.28334	0.00	P.C.	CURVE EXWILMORE_6
	3+34.89		0.00	866201.41449	1605054.70946	0.00	P.I.	CURVE EXWILMORE_6
	3+93.85		0.00	866168.54366	1605003.87094	0.00	P.T.	CURVE EXWILMORE_6
	4+77.51		0.00	866123.11930	1604933.61695	0.00	P.C.	CURVE EXWILMORE_9
	5+32.19		0.00	866093.42812	1604887.69613	0.00	P.I.	CURVE EXWILMORE_9
	5+85.13		0.00	866085.96866	1604833.52378	0.00	P.T.	CURVE EXWILMORE_9
	6+19.36		0.00	866081.29929	1604799.61376	0.00	P.C.	CURVE EXWILMORE_12
	6+61.74		0.00	866075.51738	1604757.62425	0.00	P.I.	CURVE EXWILMORE_12
	7+03.88		0.00	866061.96558	1604717.46336	0.00	P.T.	CURVE EXWILMORE_12
	7+56.16		0.00	866045.25031	1604667.92753	0.00	P.C.	CURVE EXWILMORE_15
	8+21.18		0.00	866024.46194	1604606.32101	0.00	P.I.	CURVE EXWILMORE_15
	8+85.83		0.00	865992.72915	1604549.57113	0.00	P.T.	CURVE EXWILMORE_15
	9+26.70		0.00	865972.78250	1604513.89918	0.00	P.C.	CURVE EXWILMORE_18
	9+58.12		0.00	865957.44612	1604486.47210	0.00	P.I.	CURVE EXWILMORE_18
	9+89.20		0.00	865935.63266	1604463.85303	0.00	P.T.	CURVE EXWILMORE_18
	12+39.94		0.00	865761.57593	1604283.36812	0.00	POINT	EXWILMORE21
	14+66.68		0.00	865582.15265	1604144.73799	0.00	END OF EXISTING CENTERLINE CHAIN	EXWILMORE22

"THIS MEDIA SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT."

DATE PREPARED

ROUTE | STATE MO

DISTRICT | SHEET NO.

COUNTY

JOB NO.

CONTRACT ID.

PROJECT NO.

BRIDGE NO.

DESCRIPTION | DATE

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

Coordinated Point Sheet
Sheet of

SECTION 616

TEMPORARY TRAFFIC CONTROL

616.1 Description. This work shall consist of furnishing, installing, operating, maintaining, cleaning, relocating and removing temporary traffic control devices and equipment, and the removal and relocation or covering and uncovering of existing signs and other traffic control devices in accordance with the contract documents or as directed by the engineer. For purposes of this specification, the work zone will be defined as the area between the first and last temporary traffic control device as shown on the plans for the work being performed.

616.2 Material. All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Section
Temporary Traffic Control Devices	1063

616.3 Safety Requirements.

616.3.1 All traffic control devices shall be in accordance with the MUTCD and any applicable safety and design codes.

616.3.2 The contractor shall furnish a manufacturer's certification of crashworthiness, per NCHRP 350 or AASHTO Manual for Assessing Safety Hardware (MASH) Evaluation Criteria, for FHWA Category 1 traffic control devices and appurtenances. The contractor shall furnish the FHWA acceptance letter for FHWA Category 2 and Category 3 traffic control devices and appurtenances. The FHWA acceptance letter shall indicate that the device and appurtenance complies with the crash test requirements of NCHRP 350 or (MASH), Test Level 3 (TL-3). Regardless whether the device meets NCHRP 350 or (MASH) criteria, the engineer reserves the right of final approval. Installation of a device prior to the engineer's approval will be at the contractor's risk.

616.3.3 The contractor shall:

(a) Designate an individual as the Work Zone Specialist (WZS) who is knowledgeable and competent by training and/or certification in the principles of proper temporary traffic control in accordance with Chapter 6 of the MUTCD, and who has the primary responsibility, with sufficient authority, for implementing the traffic management plan and other safety and mobility aspects of the project. The WZS shall be directly involved with daily traffic management, and shall communicate pertinent information with the engineer either in person or via telecommunication. Duties of the WZS shall include monitoring the work zone to ensure an efficient flow of traffic, correcting any failed or misaligned traffic control signs or devices, and recommending traffic management improvements to the engineer. The name, certification, and a 24-hour contact number for the WZS shall be provided to the engineer prior to the start of work. If the contractor makes a change in the designated WZS, the engineer shall be notified immediately. The WZS shall be trained and certified by a qualified person as defined by the Occupational Safety and Health Administration. The WZS shall have a card

and/or certificate that includes the WZS's name, instructor's name and title, training entity/agency, date of training, and signature of the instructor. Re-certification of the WZS shall be required a minimum of every four years.

(b) Ensure all contractor personnel are trained in traffic control to a level commensurate with their responsibilities.

(c) Obtain authorization from the engineer for any lane closure or traffic shift at least two working days prior to the planned closure or lane shift. Requests for complete road closures, or any imposition of height, width or weight restrictions shall be submitted to the engineer for approval at least 15 calendar days prior to the planned closure or restriction. The engineer reserves the right to deny any request for lane closure, traffic shift, road closure or restrictions of height, width or weight that the engineer determines could be in conflict with other known or anticipated traffic impacts, including but not limited to, outstanding permits that have been issued by the Commission for oversized or overweight loads.

(d) Perform quality control of work zones to promote consistency and ensure compliance with contract documents, policies and guidelines.

616.4 Construction Requirements.

616.4.1 Performance and operational aspects of the devices shall be in accordance with the latest editions of the MUTCD and the Missouri *Quality Standards for Temporary Traffic Control Devices*.

616.4.1.1 All traffic control devices shall be removed as soon as practical when the devices are no longer needed. When work is suspended for short periods of time, traffic control devices that are no longer appropriate shall be turned away from traffic, removed or covered. All temporary traffic control devices shall be removed after the completion of construction and shall remain the property of the contractor unless specified otherwise. All permanent traffic control devices that are in conflict with temporary traffic control devices shall be covered or removed as shown on the plans or as directed by the engineer. Upon completion of the work, all permanent traffic control devices to remain in place shall be restored to original condition.

616.4.1.2 All sign covers shall meet the requirements of the MoDOT *Quality Standards for Temporary Traffic Control Devices.*

616.4.1.3 All permanent traffic control devices relocated on a temporary basis shall be moved in the timeframe designated by the engineer, and shall remain visible to the traveling public during all stages of construction. The contractor shall place temporarily relocated permanent traffic control devices in the final location when construction is complete. Damaged devices shall be replaced by the contractor at the contractor's expense.

616.4.2 The contract will indicate the minimum requirements for traffic control. With the engineer's approval, the contractor may add to the traffic control plan any temporary traffic control devices or services the contractor considers necessary to adequately protect the public and the work. Device quantities may be adjusted accordingly.

616.4.2.1 Signs and sign quantities for blasting areas will not be included in the contract traffic control plan. The contractor will be responsible for furnishing, installing, maintaining and removing blasting zone signs in accordance with the MUTCD, at the contractor's expense. Placement of blasting zone signs will be subject to approval from the engineer.

616.4.2.2 All changes to the traffic control plan resulting from contractor staging revisions, including proposed total road closures for the contractor's convenience, shall be submitted in writing to the engineer for review and acceptance prior to implementation. Device quantities may be adjusted accordingly.

616.4.2.3 If the engineer determines the need for additional traffic control devices not included in the traffic control plan, the contractor will be notified in writing to provide the additional devices. Reimbursement for authorized changes to the traffic control plan will be made in accordance with Sec 104.3, unless covered by contract unit prices.

616.4.2.4 The contractor shall monitor traffic flow through the project and verify that all traffic control devices are in place and functioning properly during both daytime and nighttime conditions, as applicable. If the contractor determines that a deficiency in any traffic control device exists, the contractor shall take corrective action. No additional payment will be made for the corrective action.

616.4.2.5 As soon as possible after observing a traffic control deficiency, the engineer will report the deficiency to the contractor, either verbally or in writing. After receiving notification, if the contractor does not make corrections within an agreed upon timeline, order records or suspension of the work may occur. Regardless of the severity of the deficiency, corrections shall be made as soon as possible to maintain a quality work zone.

616.4.2.5.1 The severity of a deficiency will be categorized as follows:

(a) Category 1 – Presents an immediate danger to the traveling public or workers and needs to be addressed immediately.

(b) Category 2 – The situation doesn't pose an immediate threat to either the public or the workers, but can impact the proper functioning of the work zone.

(c) Category 3 – The situation doesn't impact the functioning of the work zone but is more of a maintenance or aesthetic issue.

616.4.2.5.2 When the engineer determines that the contractor has not made a good faith effort in correcting a deficiency as agreed upon in Sec 616.4.2.5, an order record will be issued and the contractor will be notified of the following timelines to correct the deficiency.

(a) A Category 1 deficiency shall be corrected within one hour.

(b) A Category 2 deficiency shall be corrected within 24 hours.

(c) A Category 3 deficiency shall be corrected within 96 hours.

616.4.2.5.3 When the engineer determines the contractor has not made a good faith effort in complying with an order record issued in accordance with Sec 616.4.2.5.2, the following action may be taken:

(a) A second order record will be issued.

(b) The engineer may find the contractor in violation of the contract in accordance with Sec 105.

616.4.2.5.4 For reoccurring deficiencies of similar nature within the contractor's control, the engineer may issue order records in accordance with Sec 616.4.2.5.3, bypassing Sec 616.4.2.5.2 requirements.

616.4.2.6 The contractor shall provide written notice to the engineer of any pedestrian or vehicular accident when physical evidence or other information suggests an accident has occurred in the work zone. The contractor shall obtain and provide to the engineer copies of law enforcement accident reports for any accidents in the work zone.

616.4.3 Each flagger, automated flagger assistance devices (AFAD) operator, portable signal flagging device (PSFD) operator and pilot vehicle operator shall maintain a valid flagger certification card that certifies the individual has been trained by a qualified person as defined by the Occupational Safety and Health Administration, in the principles and procedures of flagging in accordance with Chapter 6 of the MUTCD. Flagger certification cards shall include the flagger's name, instructor's name and title, training entity/agency, date and signature of the instructor. Flagger certifications shall be provided to the engineer prior to flagging operations. Flagger re-certification shall be required a minimum of every four years. Certifications will not be required in emergency situations that arise due to actions beyond the contractor's control when flagging is necessary to maintain safe traffic control on a temporary basis. All flagging, AFAD, PFD and pilot vehicle operations shall be in accordance with the MUTCD. Flaggers and pilot vehicles shall be provided as shown on the plans or as approved or directed by the engineer. When not specified in the plans, the contractor may use a Type B (Red/Yellow Lens) AFAD PSFD or pilot vehicle to supplement the flagging operation upon approval from the engineer. When two-way traffic is maintained over a single lane, each flagger, AFAD operator, if used in tandem, and pilot vehicle operator involved in the traffic flagging operation shall be equipped with a portable, two-way, communication system approved by the engineer. When the AFED or PSFD are not in use they shall be removed from the roadside.

616.4.4 Crossovers for hauling material will be permitted only at locations indicated in the traffic control plan or as authorized by the engineer. Modifications to specified locations shall be in accordance with applicable portions of Sec 104. Crossovers shall be signed in accordance with the traffic control plan. When the project has been completed, temporary crossovers shall be removed and the area restored to original condition. Existing crossovers shall be restored to original condition, including surface material.

616.5 Lighting Requirements.

616.5.1 Amber or Amber and White Warning Lights. All on-road construction-related vehicles and equipment shall operate with amber or amber and white warning lights having 360 degrees of total coverage and as follows:

(1) For daytime operations, SAE Class 1 or 2 lights shall be used.

(2) For dusk to dawn operations, SAE Class 2 lights shall be used, or SAE Class 1 lights with dimming capabilities to minimize glare experienced by travelers.

616.5.1.1 Red or Red and Blue Warning Lights. The contractor may elect to use red or red and blue warning lights in accordance with Missouri law 307.175 RSMo. and the following requirements:

(1) Use of red or red and blue lights shall be limited to use on a total of two vehicles per work zone and/or project.

(2) Use of red or red and blue warning lights shall be limited to areas in advance of tapers or lane shifts and at the active work location.

(3) Lights shall be SAE Class 2 or SAE Class 1 with dimming capabilities to minimize glare experienced by travelers.

The awarded contract will serve as a permit by the Commission, granting the prime contractor and approved sub-contractors to utilize red or red and blue lights as required by Missouri law.

616.5.2 Work zone lighting shall be provided between dusk and dawn as specified in Secs 616.5.2.1 and 616.5.2.2. Lighting systems shall be positioned such that the lighting systems do not cause glare or hot spots, i.e. concentrated areas of high lighting intensity when compared to the average, for motorists, spillover to adjacent properties or become safety concerns. When work zone lighting is required, a lighting plan shall be submitted to the engineer for review 14 days prior to the start of operations. The lighting plan shall show the areas to be illuminated, the type and layout of the lighting systems and calculations of average maintained footcandles.

616.5.2.1 Work area lighting shall be provided in areas where construction equipment and labor are active. Lighting shall provide a minimum maintained intensity of 5 footcandles.

616.5.2.2 Overhead lighting shall be provided for flaggers and other specified locations shown on the plans. Lighting in these areas shall provide a minimum maintained intensity of 5 footcandles.

616.5.2.3 Type A, Type C, and Sequential lights shall be visible on a clear night from a distance of 3,000 feet (2). Type B lights shall be visible on a sunny day when viewed without the sun directly on or behind the device from a distance of 1,000 feet (2).

(1) Length of time that instantaneous intensity is equal to or greater than effective intensity.
(2) This visibility must be maintained within a solid angle 9-degrees on each side of the vertical axis, and 5-degrees above and 5-degrees below the horizontal axis.

Sequential flashing warning lights shall be placed within the merging taper and be able to communicate with other lights with the sequence. The lights should be capable of being spaced at least 60 feet apart with an offset capability of at least 6 feet.

Warning lights shall be battery- or solar-powered and consist of a single unit (head and housing).

616.6 Flashing Arrow Panel. The contractor shall deploy, operate and maintain flashing arrow panels as specified on the plans for the duration of the project, in accordance with the manufacturer's recommendations, at the contractor's expense. A minimum vertical clearance of 7 feet shall be maintained from the edge of pavement to the bottom of the flashing arrow panel.

616.6.1 When not in use, trailer-mounted flashing arrow panels shall be stored in accordance with Sec 107.5.

616.6.2 Control programs shall be as follows:

(a) Flashing Caution: Flash the two highest and two lowest lamps on panel simultaneously.

(b) Alternating Diamond Caution: Flash eight lamps in a form of a diamond and alternates diamonds from left side to right side.

(c) Flashing Left or Right Arrow: Flash five lamps in the arrowhead and five lamps in the horizontal shank simultaneously.

(d) Sequential Arrow Left or Right Arrow: Five lamps in the arrowhead will move across the panel. The horizontal shank increases in length as the arrowhead moves across the panel.

(e) Double Arrow: Flash five lamps in both the left and right arrowheads and three lamps in the horizontal shank simultaneously.

The contractor has the option to use the sequential arrow or alternating diamond caution modes on mobile operations.

616.7 Changeable Message Signs. The contractor shall place the changeable message sign (CMS) at the location shown on the plans or as directed by the engineer. The CMS shall not be located in the median. When in operation, the bottom of a sign must be at least 7 feet above the roadway.

616.7.1 The contractor shall deploy, operate and maintain the CMS as specified in the traffic control plan and in accordance with the manufacturer's recommendations for the duration of the project at the contractor's expense. The contractor shall program the CMS as directed by the engineer.

616.7.2 When the CMS is not in use, the message board shall be turned away from traffic. When not required for longer than a 24-hour period, the CMS shall be stored in accordance with Sec 107.5.

616.7.3 When a CMS with Communication Interface is specified in the plans, the contractor shall operate and maintain the CMS, including setting up initial communications and paying all monthly communications fees. The contractor shall furnish the telephone number and contract information for the contractor's work zone specialist who will immediately program the CMS board remotely under the direction of the engineer.

616.8 Work Zone Traffic Signals. Work Zone Traffic Signals (WZTS) provide one-lane, two-way temporary traffic control through the use of a temporary traffic signal or a portable traffic signal programmed for two-phase operation. WZTS shall be in accordance with the provisions of this section. Unless otherwise shown on the plans, the contractor may choose either method to fulfill the WZTS requirement.

616.8.1 The contractor shall notify the engineer at least 48 hours prior to the work zone traffic signal installation. After installation, the contractor shall receive approval from the engineer prior to activating the WZTS system. The contractor shall provide a service technician to be available for day, night and weekend trouble calls as required under test period requirements in Sec 902. The contractor shall furnish the telephone number or other contact information where the technician can be reached.

616.8.1.1 The contractor shall operate and maintain the WZTS, at the contractor's expense, as specified in the traffic control plan until two-way traffic is restored.

616.8.1.2 When the WZTS is not in use, the signal heads shall be covered to the satisfaction of the engineer.

616.8.1.3 Adequate traffic control, including flaggers, shall be provided at the contractor's expense during the startup and shutdown of the WZTS installation. If the WZTS installation

becomes inoperable due to alterations, malfunctions or periods of shutdown for required maintenance when one-way traffic control is required, the contractor shall provide adequate traffic control, including flaggers, at the contractor's expense.

616.8.1.4 All signal timing and programming shall be provided by the contractor and furnished to the engineer for approval prior to use. The contractor shall ensure proper signal timing is provided for the duration of the project. The contractor shall provide the locations of the vehicle detection zones.

616.8.1.5 The WZTS and lighting system shall be removed after two-way traffic has resumed or as directed by the engineer. All equipment shall remain the property of the contractor.

616.8.1.6 Measurement of WZTS systems, consisting of lighting and traffic signals at both ends of a one-lane, two-way section, will be made per each.

616.8.2 Temporary Traffic Signals. Temporary traffic signals and lighting shall be in accordance with Sec 902.3.

616.8.3 Portable Traffic Signals. Portable traffic signals shall be in accordance with Sec 1063. The contractor shall place the portable traffic signal (PTS) units a minimum of6 feet beyond the edge of shoulder at the location shown on the plans or as directed by the engineer. Each unit shall be level to the satisfaction of the engineer. Each PTS shall be delineated with a minimum of five non-metallic drum-like channelizers. The PTS shall not be located in the median.

616.8.3.1 When not required for a longer than a 24-hour period, the PTS shall be stored in accordance with Sec 107.5.

616.8.3.2 The contractor shall deploy, operate and maintain the PTS in accordance with the manufacturer's recommendations. The contractor shall provide two copies of the operating manual to the engineer.

616.8.3.3 Overhead lighting with an average maintained intensity of 0.6 footcandles shall be provided and maintained at each PTS location as authorized by the engineer.

616.9 Portable Signal Flagging Device. Portable signal flagging devices (PSFD) shall be installed on each side of roadway per direction and in accordance with Sec 1063.9.

616.10 Radar Speed Advisory System

616.10.1 The contractor shall place the Radar Speed Advisory System at the location shown on the plans or as directed by the engineer.

616.10.2 The contractor shall deploy, operate and maintain the Radar Speed Advisory System as specified in the traffic control plan and in accordance with the manufacturer 's recommendations for the duration of the project at the contractor 's expense. The contractor shall program the Radar Speed Advisory System as directed by the engineer and shall not include advertising, animation, rapid flashing, dissolving, exploding, scrolling, or other dynamic elements as stated in Chapter 2L of the MUTCD.

616.10.3 When the Radar Speed Advisory System is not in use, it shall be turned away from traffic. When not required for longer than a 24-hour period, the Radar Speed Advisory System shall be stored in accordance with Sec 107.5.

616.11 Method of Measurement. Measurement for relocation of post-mounted signs will be made to the nearest square foot of sign area.

616.12 Basis of Payment. All temporary traffic control devices authorized for installation by the engineer will be paid for at the contract unit price for each of the pay items included in the contract. No direct payment will be made for the following:

(a) Incidental items necessary to complete the work, unless specifically provided as a pay item in the contract.

(b) Installing, operating, maintaining, cleaning, repairing, removing or replacing traffic control devices.

(c) Covering and uncovering existing signs and other traffic control devices.

(d) Relocating temporary traffic control devices, including permanent traffic control devices temporarily relocated, unless specifically included as a pay item in the contract.

(e) Worker apparel.

(f) Flaggers, AFADs, PFDs, pilot vehicles, and appurtenances at flagging stations.

(g) Furnishing, installing, operating, maintaining and removing construction-related vehicle and equipment lighting.

(h) Construction and removal of temporary equipment crossovers, including restoring pre-existing crossovers.

(i) Provide and maintaining work zone lighting and work area lighting.

SECTION 1063

TEMPORARY TRAFFIC CONTROL DEVICES

1063.1 Scope. This specification covers material to be used for temporary traffic control devices.

1063.2 General Requirements. All temporary traffic control devices shall be manufactured as shown on the plans and as specified, in accordance with MUTCD requirements and shall be NCHRP 350 compliant. Nominal dimensions will be permitted for dimensional lumber where applicable. All temporary traffic control devices shall exhibit good workmanship and shall be free of objectionable marks or defects that affect appearance or serviceability. The brand name or model number shall be permanently identified on each traffic control device.

1063.3 Channelizers. All trim-lines and drum-like channelizers shall be manufactured from a non-metallic material, pigmented and molded of a Highway Orange color throughout and stabilized against fading by ultraviolet or other light rays by the incorporation of adequate inhibitors.
All reflective sheeting for channelizers shall be in accordance with Sec 1042.2.7.3.

1063.3.1 Temporary Tubular Delineators. Temporary tubular delineators shall be a nominal height of 28 inches and manufactured from a non-metallic material, pigmented and molded of a Highway Orange color throughout and stabilized against fading by ultraviolet or other light rays by incorporation of adequate inhibitors. All reflective sheeting for temporary tubular delineators shall be in accordance with Sec 1042.2.7.5.

1063.4 Signs.

1063.4.1 Rigid Signs.

1063.4.1.1 Sign Substrate. All signs shall be fabricated of substrate designed to provide satisfactory structural rigidity.

1063.4.1.2 Sign Sheeting. All signs shall have a retroreflectorized background. Retroreflective sheeting shall be in accordance with Sec 1042.2.7.2. Sheeting shall be applied to the sign substrate in accordance with the manufacturer's recommendations and the surface shall be free of air bubbles, wrinkles or other blemishes as determined by the engineer.

1063.4.2 Roll-up Signs.

1063.4.2.1 Sign Substrate. Sign and overlay blanks shall consist of either white, yellow, fluorescent orange and/or pink microprismatic retroreflective sheeting sealed to a heavy-duty coated fabric or vinyl material. The sheeting shall have a minimum coefficient of retroreflection, expressed as candelas per footcandle per square foot, as shown below, when measured in accordance with ASTM E 810 and shall meet the minimum color requirements in accordance with MGS-04-01L specification. The color specifications shall be in accordance with ASTM D 4956. Material shall be submitted by the manufacturer to NTPEP for a minimum exposure time of one year. Results shall be published by NTPEP and available for MoDOT review. For all NTPEP test decks, weathered material shall be within the color specification limits. Heat and impact resistance of the sheeting shall be in accordance with the latest version of ASTM D 4956.

1063.4.2.2 Overlays. Overlays, when used, shall be mechanically fastened to the face of the sign in a manner that will ensure the overlay remains securely attached. Fasteners shall not detract from the appearance of the sign when the overlay is not in use. Velcro fasteners will not be permitted.

1063.4.2.3 Bracing. Each sign shall have a horizontal and vertical cross brace and at least one anti-kiting device located near the center of the sign. Cross braces of sufficient cross-section shall be fastened to each other at the midpoints and the ends securely held to the back of the sign by mechanical means. The design shall ensure that the sign remains taut and retains the sign's intended shape when exposed to normal field conditions.

1063.4.3 Legend and Borders. Legends and borders of all signs shall be vinyl or silk-screened. Vinyl shall be cut by die or a computer-driven cutter. Stencil ink used shall be in accordance with the sheeting manufacturer's recommendations. Free-hand legend and borders will not be permitted.

1063.4.4 Sign Layout and Design. Sign layout and design shall be as shown on the plans or as directed by the engineer.

1063.4.5 Flag Assembly. Flag assemblies, when specified, shall consist of a flag bracket and two flags. Flags shall be 18 in x 18 in fluorescent orange, vinyl and be securely attached on one side to a blank suitable for displaying the flag as shown on the plans. The flag shall not be of mesh material. The blank shall be securely attached to the flag bracket, be of sufficient cross-section to display the flag in wind speeds up to 50 mph and be of sufficient length to hold the flags approximately six inches from the sign.

1063.4.6 Advance Warning Rails. Advanced warning rails shall be supplied as a system of three rails as shown on the plans. The rail system may be post mounted or mounted on portable structures**.** When used on post mounted signs, the advance warning rails shall consists of substrate of high-density polyethylene plastic. The rail wall thickness shall be 1/4 in. with white and orange reflective sheeting in accordance with Sec 1042.2.7.4, and shall be applied as shown on the plans.

1063.5 Warning Lights.

Warning Lights				
Item	**Type A Low Intensity**	**Type B High Intensity**	**Type C Steady Burn**	**Sequential Flashing**
Lens Directional Faces	**1 or 2**	**1**	**1 or 2**	**1**
Flashing Rate per Minute	**55 to 75**	**55 to 75**	**Constant**	**55 to 75**
Minimum (1)	**10%**	**8%**	**Constant**	**Constant**
Hours of Operation	**Dusk to Dawn**	**24 hrs/day**	**Dusk to Dawn**	**24 hrs/day**

1063.6 Flashing Arrow Panels. All lamps shall have a nominal 5-inch, 360-degree tunnel visor. A lamp on the back side of the flashing arrow panel shall be continuously energized during operation of the flashing arrow panel. Lamps shall be visible at an angle of 15 degrees to the left and right of center and 4 degrees above and below center during "on" time. The flashing arrow panel shall contain a device to align the arrow panel to oncoming traffic. Arrow panels shall be capable of displaying the flashing arrow, flashing double arrow and four corner flashing caution modes. Solar-powered flashing arrow panels shall be capable of operating in the flashing arrow mode for 20 consecutive days and shall be provided with a device to indicate the remaining charge in batteries.

1063.6.1 Trailer-Mounted Flashing Arrow Panels. Trailer-mounted flashing arrow panels shall be MUTCD, Type C. Trailer-mounted flashing arrow panels shall be solar powered.

1063.6.2 Truck-Mounted Flashing Arrow Panels. Truck-mounted flashing arrow panels shall be MUTCD, Type B.

1063.7 Changeable Message Sign. Each portable Changeable Message Sign (CMS) shall consist of a message board, solar power supply, control systems and mounting and transporting equipment. The unit shall be assembled to form a complete self-contained CMS that can be delivered to the job site and placed into immediate operation. The sign unit shall be capable of operating at an ambient air temperature of -20 to 120 degrees F. and shall not be affected by mobile radio transmissions other than those required to control the CMS.

A CMS shall be permanently mounted on a trailer, truck bed, or truck cab per manufacturer's recommendations. The CMS must be securely mounted on the support vehicle such that it should remain attached during an impact to the vehicle. If it is mounted on a trailer, the trailer must be capable of being leveled and plumbed.

CMS trailers should be delineated on a permanent basis by affixing retroreflective material, per Sec 1042.2.7 in a continuous line on the face of the trailer as to be seen by oncoming road users

1063.7.1 Message Board. The CMS shall be equipped with a power source and battery back-up to provide continuous operation when failure of the primary power source occurs. Either message board shall be capable to provide three lines of eight individual changeable characters per line. Each character shall be yellow in display on a black background and be a minimum of 18-inches in height. ~~The~~ CMS used on roadways with speed limits of 55 mph or higher should be visible from ½ mile under both day and night conditions. The message should be designed to be legible from a minimum of 600 ft. for nighttime conditions and 800 ft. for normal daylight conditions. When environmental conditions that reduce visibility and legibility are present, or when the legibility distances stated in the previous sentences in this paragraph cannot be practically achieved, messages composed of fewer units of information should be used and consideration should be given to limiting the message to a single phase. ~~shall be legible up to a distance of 650 feet for both day and night operation~~.

1063.7.1.1 The CMS shall have a control system to allow the message to be changed from the CMS location ~~without connection~~. The control system shall include a display screen upon which messages can be reviewed before being displayed on the sign and a variable display rate that allows the operator to match the information display to the speed of the approaching traffic~~sign~~. For on~~sight~~site operation, the CMS shall have a removable waterproof keyboard with display panel that allows the operator to generate an unlimited number of additional messages in addition to the preprogrammed stored messages. The keyboard must be equipped with a security lockout feature to prevent unauthorized use of the controller.

~~**1063.7.1.2** The supplier shall provide web based software and licenses necessary to change the message from a remote location. This software shall be compatible with MoDOT's operating systems and shall be able to issue compatible modem commands.~~

1063.7.2 Changeable Message Sign with Communication Interface. ~~If specified, t~~The CMS with communication interface shall have a digital cellular transceiver capable of receiving a message in the location deployed from a remote location and forwarding the message to the CMS controller to change the displayed message. All costs, including monthly fees, incurred by the contractor for cellular connection will be considered covered by the contract unit price.

1063.7.3 Solar Power Supply. The CMS shall be equipped with a power source and battery back-up to provide continuous operation when failure of the primary power source occurs.

1063.8 Portable Traffic Signals. Each portable traffic signal (PTS) system shall consist of two trailer-mounted PTS units, a controller assembly and communication link. Each PTS unit shall consist of signal heads and indications, a solar power supply, vehicle detection and mounting and transporting equipment. All components shall be capable of operating in a temperature range of -20 to 120 F.

1063.8.1 Controller Assembly. The controller assembly shall be a minimum two-phase, solid-state traffic signal controller with a conflict monitor capable of operating the signals in accordance with MUTCD requirements and NEMA Standard TS1. The controller shall operate as a fully-actuated unit and shall have the capability of being manually operated to display simultaneous red on both phases. The controller shall be capable of red rest during non-actuated periods. Upon detection of a conflict, the system shall change to a solid red clearance interval followed by flashing red.

1063.8.2 Communication Link. A continuous communications link between the PTS units shall be provided. If a break in communications between the PTS units occurs, the system shall change to a solid red clearance interval followed by flashing red. Upon restoration of communications, the system shall change to a solid red clearance interval followed by normal operations.

1063.8.3 Signal Heads and Indications. Each unit shall consist of two polycarbonate signal heads, including backplates and visors. One signal head shall be mounted on the mast arm assembly and the other on the vertical upright. The signal head mounted on the mast arm shall provide a minimum lateral clearance of 9.5 feet from the center of the outer signal head to the edge of the trailer and a minimum vertical clearance of 16 feet from the bottom of the backplate to the roadway surface. The signal head mounted on the vertical upright shall provide a minimum clearance of 8 feet from the bottom of the backplate to the roadway surface. All signal indications shall be 12 inches in diameter. Traffic signal heads and indications shall be in accordance with the vehicle traffic control signal head requirements of ITE and NEMA Standard TS1 and TS2.

1063.8.4 Solar Power Supply. The power supply shall use a battery bank with sufficient capacity to operate the PTS for 20 consecutive days with no sun. All terminals and connections shall be clearly labeled.

1063.8.5 Vehicle Detection. Detection shall be provided by one of the non-intrusive vehicular detection methods specified in Sec 902 or temporary loop detectors with the capability of providing coverage for a 6-foot x 30-foot area. Temporary loops shall be preformed at the factory. The temporary loops shall have self-adhesive rubberized asphalt backing, which shall bond to the pavement.

1063.8.6 Support. A factory trained service representative shall be available at the delivery location to provide technical assistance and training, including the installation and operation of software. No additional payment will be made for travel expenses.

1063.9 Portable Signal Flagging Device. Each portable signal flagging device (PSFD) system shall consist of four portable cart-mounted units. Each PSFD unit shall provide a vertical upright with one signal head, vehicle detection, radio controller, and self-contained power supply capable of operating the unit for 16 continuous hours. All components shall be capable of operating in a temperature range of –20 to 120 F.

1063.9.1 Signal Heads and Indications. The signal head shall consist of three (red ball, amber ball, green ball) 12-inch LED signal indications. All signal heads shall be mounted on the vertical uprights with a minimum clearance of 7 feet when the upright is fully extended.

1063.9.2 Vehicle Detection. Detection shall be provided by one of the non-intrusive vehicular detection methods specified in Sec 902 with the capability of providing coverage for a 6-foot x 30-foot area.

1063.9.3 System Operation. The system shall be able to operate in a fixed-time, traffic-actuated, and manual-control mode. The system shall be MUTCD compliant with a controller and conflict monitor and include a wireless radio communication package and wireless remote.

1063.10 Radar Speed Advisory System. Each radar speed advisory system shall consist of a radar unit, speed display, speed limit display, solar power supply and mounting and transporting equipment.

1063.10.1 Radar Unit. The radar unit shall include necessary cables for connection to the digital display and power supply, shall be capable of instantaneously displaying and locking readings and shall meet the following minimum requirements:

Radar Unit Requirements	
Speed range	15 to 99 mph
Accuracy	±1 mph
Internal test	32 mph check

1063.10.2 Speed Display. The speed display shall be a minimum of 12 inches high and shall be capable of displaying the radar unit output from 0 to 99 mph.

1063.10.3 Speed Limit Display. The speed limit display shall indicate the work zone speed limit by means of a 36 x 48-inch speed limit sign. The speed limit sign may be comprised of a rigid or roll-up sign or a rigid sign with a variable speed display. The variable speed display shall be a minimum of 12 inches high and shall be capable of displaying two digits.

1063.10.4 Solar Power Supply. The power supply shall be capable of operating the radar unit, speed display and speed limit display, if applicable, for a minimum of eight hours per day.

1063.11 Truck or Trailer Mounted Attenuators. Each Truck or Trailer Mounted Attenuator (TMA) shall be in accordance with Test Level 3 criteria as set forth in NCHRP 350 or MASH. Each TMA shall have a standard trailer lighting system, including brake lights, taillights, turn signal lights and Federal Motor Carrier Safety Administration identification bar lights. In the operating position, the rear facing of the TMA shall be marked with alternating 8-inch yellow and 8-inch black retroreflective sheeting forming an inverted “V” at the center and slope downward at an angle of 45 degrees toward each side of the unit or a checkered board pattern consisting of 12-inch square red and 12-inch square white retroreflective sheeting. The TMA may be marked with the same operating pattern or red and white DOT conspicuity tape to simulate the looks of a standard van body trailer when traveling. The TMA shall have the same standard trailer lighting system noted above when the unit is in the transport position.

1063.12 Certification. The contractor shall furnish a manufacturer's certification for all material governed by this specification. The certification shall indicate full compliance with each applicable specification.