

1.01 EXISTING TYPICAL SECTION

Most project plans show an existing roadway typical section, except when the project has a completely new alignment. When the existing roadway is to be overlaid or reconstructed, the new standards should be reviewed for reasonable application to the existing typical roadway section.

The existing typical section is the roadway cross-section that exists prior to new construction or roadway improvements. The typical section usually consists of the roadway lane widths, shoulder widths, z-slope distance, side slopes, and may include curb and gutter or barriers. Many existing roadways were constructed under old standards and do not meet current roadway design standards.

The Resident Engineer will compare the existing roadway section to the latest standard typical section based on the roadway functional classification. The Division of Transportation Development is developing a web site that contains road inventory data such as functional classification. The website is at <http://internal/dtd\dataaccess\index.html> or <http://dhqntw/dtd\dataaccess\index.html>).

The roadway typical section should be upgraded to the latest standard in accordance with the *CDOT Design Guide*. Resurfacing projects usually will not require a change in the typical section.

The existing typical section shall be documented on the Form 1048a, Project Scoping/Clearance Record, and Form 463a, Design Data.

Additional References:

1. *CDOT Procedural Directive 512.1, Project Scoping and the Design Scoping Review (DSR)*
2. *FHWA Flexibility in Highway Design*, Publication No. FHWA-PD-97-062 (1997)
3. See Appendix A for forms

1.02 PROPOSED TYPICAL SECTION

The proposed geometric typical section should be designed in accordance with the *CDOT Design Guide*. The pavement structure shall be designed by the Region Materials Engineer in accordance with the *Design Guide* and the *CDOT Pavement Design Manual*.

The proposed typical section is the roadway cross-section used on new construction or roadway improvements. The proposed typical roadway section should be in all construction plans and shall meet current CDOT or AASHTO standards, unless otherwise noted in Section 1.10 of this manual.

Travel lane width varies from 10 feet on low volume roads to 12 feet on higher volume roads, such as collectors and arterials. Shoulder width varies from 4 to 12 feet, depending on the roadway functional type. Roadway side slopes should be designed to provide adequate clear zone recovery (a relatively flat, unobstructed area) as explained in the *AASHTO Roadside Design Guide*. The designer will be required to convert the *Roadside Design Guide* values from metric to English units. The values for 120 kilometer per hour should be used for 75-mile-per-hour designs.

CDOT typical sections usually incorporate a slight sloping area bordering the shoulder or edge of the roadway referred to as the z-slope distance, detailed in the *Design Guide*. This slope is part of the clear zone design. Median and turn lane widths depend on the type of facility. The typical section usually details pavement type and thickness of lifts. Typical sections may also be contained in the plans for road approaches, bike paths, and sidewalks.

For projects within scenic or historic areas, refer to the *FHWA Flexibility in Highway Design* guidebook.

The Resident Engineer should provide a proposed typical section that meets the functional, safety and capacity requirements of the highway. The Form 463a, Design Data, shall be used to document these requirements. Any exception to the maximum or minimum standard identified on the Form 463a shall be documented in the project file. Reconstruction projects are most likely to require a new typical section. Because of budget, terrain, development or scenic conditions, new installation of a full-standard typical section may not be practical. The designer should always consider accident history of the existing facility. The designer may consult the *FHWA Flexibility in Highway Design* guidebook for these situations.

The Resident Engineer is responsible for establishing the appropriate roadway typical section that meets current CDOT standards. Current and future traffic counts, current and future land use, and the functional class and use of the highway facility shall be considered, including alternate modes, such as bicycles. The proposed roadway typical

section should be finalized no later than two weeks after the Field Inspection Review, as evidenced by the Field Inspection Review plans and on the final Form 463a. In general, the typical section should not change significantly after the Field Inspection Review is conducted, as bridge designs, right-of-way acquisition, and environmental impact can all be significantly altered by changes to the typical section. If the typical section is substantially changed, an additional Field Inspection Review meeting may be required.

The Resident Engineer should design to a typical section that meets current CDOT standards as identified on the Form 463a. If features of the typical section are substandard, a design exception shall be documented as detailed in Section 1.10 of this manual.

Prior to the Field Inspection Review, the Resident Engineer will provide the proposed typical section to the Bridge, Hydraulics, Traffic, and Environmental sections, when appropriate for the project type. Appropriate offices are to be informed of all changes to the typical section.

Additional References:

1. *AASHTO Policy on Geometric Design of Highways and Streets*
2. 23 CFR Part 625, Design Standards for Highways
3. *CDOT Procedural Directive 512.1, Project Scoping and the Design Scoping Review (DSR)*
4. *CDOT Procedural Directive 548.1, Safety Consideration of Resurfacing and 3R Type Projects*
5. *CDOT M&S Standard Plans*
6. See Appendix A for forms
7. <http://internal\dttd\dataaccess\index.html> OR <http://dhqntw\dttd\dataaccess\index.html>

1.03 STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM

The Statewide Transportation Improvement Program (STIP) documents the transportation projects the Department intends to fund over the upcoming six years. The program is available in SyBase by going to <http://internal.dot.state.co.us/deploy/> and downloading the application. Copies are available by calling the Office of Financial Management and Budget (OFMB) at (303) 757-9262.

The STIP was first federally mandated in the Inter-Modal Surface Transportation Efficiency Act of 1991 and was continued in the Transportation Equity Act for the 21st Century. It must be approved by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) before Colorado is eligible to receive federal transportation funds.

The Transportation Equity Act requires that the STIP be financially constrained based upon reasonably anticipated revenues. To accomplish this, OFMB produces revenue forecasts. The Transportation Commission distributes these revenues into control totals by program (e.g., Bridge Replacement, Safety or Transit), by CDOT Engineering Region and by fiscal year.

To be eligible for inclusion, projects must be included in the Department's 20-Year Statewide Plan. The Division of Transportation Development at (303) 757-9266 can provide information about the Statewide Plan.

The first year of the STIP comprises the Department's budget. After projects have been budgeted and obligated, they are able to accept charges and be constructed. Automated links are being created among the Statewide Plan, the STIP and ProMIS (budgeting system) to account for projects from the planning stage through implementation.

Program Updates

Every other year the STIP is updated through a continuing, comprehensive and cooperative process involving the Department, FHWA, FTA, metropolitan planning organizations, transportation planning regions, and city and county governments. A more detailed explanation of the process to update the STIP is available in the Colorado Project Priority Programming Process. Copies of this document are available by calling OFMB. The STIP update process varies depending on whether projects are located in metropolitan planning organizations or transportation planning regions.

Program Updates in Metropolitan Planning Organizations

A Transportation Improvement Program (TIP) is required for each metropolitan area exceeding 50,000 in population. These areas in Colorado, referred to as metropolitan planning organizations, are the Denver Regional Council of Governments, the Pikes

Peak Area Council of Governments, the North Front Range Transportation & Air Quality Planning Council, the Pueblo Area Council of Governments and the Grand Junction/Mesa County Metropolitan Planning Organization.

A TIP is the metropolitan area's equivalent of the STIP. The metropolitan planning organizations are responsible for the development and approval processes of their TIPs. After a TIP has been approved by the metropolitan planning organization, it is forwarded to the Governor for final approval. Following approval, the TIP is incorporated into the STIP verbatim. The only exception is transportation projects that are wholly funded by cities or counties and do not use any federal or state funds.

Program Updates in Transportation Planning Regions

To update the STIP, transportation planning region representatives meet with their appropriate CDOT Engineering Regions and Transportation Commissioners to prioritize projects.

A public meeting on the program is conducted biannually during the Transportation Commission's April meeting. Comments are considered before the Transportation Commission acts on the program. Following Transportation Commission approval, the STIP is forwarded to the FHWA and the FTA for their review and final approval.

Program Amendments

Occasionally, changes to the STIP are necessary as actual project schedules and expenditures are realized and as priorities and policies change.

There are two types of STIP amendments -- administrative amendments that do not require a public review and comment period and policy amendments that do.

Administrative Amendments

Administrative amendment can be done under the following constraints and limitations, as long as there is no change to the scope of the project, as determined by the CDOT Engineering Region and OFMB:

1. A project that costs less than \$500,000 can be added or deleted subject to the approval of the project sponsor. The project sponsor may appeal to the Transportation Commission;
2. A change can be made that does not exceed the total CDOT annual budget, excluding the Maintenance and Operations budget, by plus or minus 5 percent;
3. A project can be moved among the first three years of the current STIP and/or from the last year of the previous STIP, as long as no projects have been deleted and financial constraint is maintained;
4. The project sponsor can be changed only with the approval of the original project sponsor;
5. All TIP amendments are amended into the STIP administratively; and
6. All changes to the Surface Treatment Program are amended into the STIP administratively.

The FHWA, the FTA and the Governor have delegated the approval of administrative amendments to OFMB. The amendments are distributed to the planning organization representative who may appeal to the Transportation Commission.

Policy Amendments

Policy amendments to the STIP are required when proposed changes exceed the limitations outlined for administrative amendments. Policy amendments require a public review and comment period. Following the public review and comment period, the amendments are approved by the Transportation Commission, forwarded to the FHWA and the FTA, and distributed to planning organization representatives.

Amendment Common Practices

In addition to the formal rules above, the following common practices have evolved:

1. No amendment is required if the budgeted amount exceeds the STIP amount by less than 15 percent.
2. Policy amendments are required to transfer funds from the first three years of the STIP into the second three years and vice versa.
3. Policy amendments are required to transfer funds from the future funds column into the six years of the STIP.
4. The CDOT Engineering Regions are encouraged to consolidate projects into corridors as much as possible. Corridors allow for funding to be transferred between individual projects within the corridor without processing STIP amendments. Locations in the corridor must be contiguous.
5. Amendments are required to transfer funds from non-project specific pools into discrete projects before budget requests will be approved. Exceptions are signing, striping and Surface Treatment projects that may be budgeted directly from the pool.
6. Federal funding types (e.g., IM, NHS, STP) are selected based on the most restrictive category of project eligibility.
7. Local funds in excess of the required federal match (local overmatch) are recorded as a separate funding type.
8. STIP amendments will not be processed that delay the repayment of advance budgeted funds.

Additional References:

1. *CDOT Project Management Information System (ProMIS) Manual*
2. <http://internal.dot.state.co.us/ofmb/> *OFMB Policy and Procedure Manual*
3. *Statewide Long-Range Plan Guidebook*

1.04 MAINTENANCE INPUT

The State of Colorado is divided into CDOT Maintenance Sections for state highways. Each Region has a Maintenance Superintendent (some Regions have two superintendents) and each section has a Supervisor, commonly called a Foreman, who should be involved in the project development process. The Region or CDOT Headquarters can be contacted for the latest map and jurisdiction of Maintenance sections.

For projects on county roads or city streets including some state highways that are located within cities, maintenance is the responsibility of the entity. The city or county maintenance section should be included in the project process.

The Resident Engineer should include the CDOT and/or the entity maintenance section superintendent or foreman at the Design Scoping Review, the Field Inspection Review and the Final Office Review meetings.

Maintenance personnel can have valuable input for project design. The Superintendent or Foreman may have knowledge about high-water level at drainage structures, areas with erosion problems, roadway areas with surfacing and subbase problems, and locations where guardrail has been hit. The Maintenance Superintendent or Foreman may be familiar with sites along a project that could contain hazardous materials, underground tanks, rare vegetation, and animal habitat. They also may have valuable knowledge about current and past landowners. Maintenance can help determine stockpile locations and material pit sites. They can determine how to salvage or dispose of removed materials such as guardrail or fencing.

To reduce costs, some project construction items such as reset mileposts, signing, and pavement marking may be done by Maintenance forces. Traffic control through a construction zone will need to be coordinated with the Maintenance Superintendent.

Maintenance requirements for new design elements should be discussed with Maintenance during the design. When designing the traffic control plan, snow removal should be discussed with the Maintenance Superintendent.

The Maintenance Management System inventory lists roadway features along state roadways such as type of surface, length of ditches, and number of culverts. The Maintenance Section MMS Coordinator can provide a copy of the inventory in the project area.

Maintenance personnel comments and concerns should be documented in the review minutes and incorporated into project plans as applicable.

The Resident Engineer will notify the appropriate Maintenance Section personnel of all

project reviews during the project development process. The Maintenance representative should review the project plans and provide comments at the review or in writing to the Resident Engineer.

Additional References:

1. *CDOT Maintenance Management System, Field Manual of Instruction*
2. *CDOT Manual of Maintenance Procedures*
3. *CDOT Procedural Directive 512.1, Project Scoping and Design Scoping Review (DSR)*
4. Field Inspection Review (see Section 8.10 of this manual)
5. Final Office Review (see Section 8.12 of this manual)

1.05 ESTIMATED TOTAL PROJECT COST

Estimates need to be made for the total cost of a project for implementation into the Statewide Transportation Improvement Program (STIP), for the Design Scoping Review, Field Inspection Review, Final Office Review, and through the engineer's final estimate for bid.

Initially, the project estimate is used for the STIP to determine future budget requirements. An inadequate estimate will result in an insufficient budget to complete design and construction of a project. Accurate budgets are important for planning purposes and for the Transportation Commission to allocate funds.

The Design Scoping Review allows the opportunity to accurately determine the limits of the project and to make decisions on the extent of project improvements. A rigorously scoped project will result in a more accurate cost estimate and will reduce the occurrence of omitted items that could significantly increase project cost. Designers should prepare an estimate as accurately as possible for the Field Inspection Review with an accurate tabulation of major pay items and accurate quantities, while minor pay items may be approximated. Quantities and pay items should be accurate and complete for the Final Office Review and final cost estimate.

Costs associated with the complete estimate are:

Preliminary Engineering

Survey, design and other engineering work required to develop a complete set of project plans. For consultant-designed projects, the cost of these professional services needs to be included.

Right of Way

Property when acquiring right of way, access control and easements: The cost of contingencies (salaries, contracts and miscellaneous expenses) associated with the acquisitions and relocations. Right-of-way costs can be a substantial portion of the total cost, especially if a project is located in an urban or other high-value land area.

Utilities

Utilities, removals, installations, modifications, and/or relocations required to undertake a project, including the associated design and agreement processing. The cost may be partially or fully the responsibility of the utility owner, depending on the type of project funding, utility company, right-of-way occupancy held and local agency/utility arrangement.

Construction

Includes the construction bid items and force account items necessary to construct a project, plus construction engineering (typically 10 to 15 percent of the construction bid

item cost). Construction engineering budget costs can be a function of the funding pool on applicable projects. Preliminary prices for bid items can be obtained from the latest *CDOT Cost Data Book* prepared by the Engineer Estimating program in the Contracts and Market Analysis Branch.

Additional Items

Incurred when there are hazardous materials, environmental mitigation such as wetland areas and remediation work, use of specialized consultants, or work on railroads within a project site. Construction in close proximity to a railroad will require early coordination with the railroad company. Railroad work within a project can add significantly to costs.

The Resident Engineer will estimate project costs as accurately as possible for implementation in the Statewide Transportation Improvement Program.

The Resident Engineer will tabulate pay items and quantities for the Field Inspection Review. The Resident Engineer will request an Engineer Estimating program review of prices on the Field Inspection Review estimate, again on the Final Office Review estimate, and shall request an Engineer Estimating program review two weeks before the advertisement date.

The Resident Engineer should seek input from all sections that have potential knowledge related to project extent and cost. The Resident Engineer is responsible for the detail and accuracy of project cost estimates.

The Resident Engineer will prepare the Design Scoping Review level cost estimate, write and distribute the Design Scoping Review meeting minutes and research unresolved questions and concerns within 30 days after the Design Scoping Review but prior to the Field Inspection Review.

The cost estimate should include an estimated construction schedule. The Resident Engineer should prepare a construction duration estimate.

During the preliminary design phase, the Resident Engineer should prepare a Field Inspection Review estimate and update the estimate for the Final Office Review. The Resident Engineer shall complete the final project estimate during the final design phase.

Additional References:

1. *CDOT Procedural Directive 512.1 – Project Scoping and the Design Scoping Review (DSR)*
2. Estimate Review by Engineer Estimating (see Section 8.26 of this manual)

1.06 FUNDING SOURCES / RESOURCE ALLOCATION

State, federal and local funding sources are used to provide for all modes of transportation including aviation, transit, bicycle, pedestrian, rail, bridge replacement and highways.

Colorado's highway construction program is primarily funded through the Federal Highway Users Trust Fund, the Colorado Highway Users Tax Fund and special legislation.

Major sources of the Colorado Highway Users Tax Fund are the motor fuel taxes, drivers' license fees, and motor vehicle registration fees. The motor fuel taxes constitute approximately 75 percent of the fund.

CDOT prepares resource allocation projections that reflect revenues for a 20-year period to match the timeframe of the Long-Range Transportation Plan.

Revenue Forecasting

Revenue forecasts include all "reasonably anticipated" revenues known to be available to the Colorado Transportation Commission to fund capital improvements, maintenance, and operations for existing and expanded facilities and services of the State of Colorado transportation system.

Every four to six years, Congress passes a new surface transportation act. For resource allocation purposes, it is assumed that the federal program will continue at the same funding level and contain the same program categories.

Financial constraint of the Statewide Transportation Improvement Program (STIP) works through the "highest use" concept. Projects are programmed in the STIP with the highest federal funding source that each project qualifies to use. The highest federal funding category is the Interstate, and the next highest federal funding category is the National Highway System. By funding each project with the highest funding source for which it qualifies, the Office of Finance, Management and Budget enables Regions to select projects based on need, not federal funding type.

Following is a summary of assumptions used in developing the federal-aid highway revenue forecasts:

Interstate Maintenance	(Matching Ratio: 88.6/11.4)
National Highway System	(Matching Ratio: 83.3/16.7)
Congestion Mitigation/Air Quality	(Matching Ratio: 80.4/19.6)
Surface Transportation Program:	
10% for Safety	(Matching Ratio: 87.4/12.8)
10% for Enhancement	(Matching Ratio: 77.7/22.3)

Metro Program	(Matching Ratio: 80.4/19.6)
Flexible Program	(Matching Ratio: 80.4/19.6)
Bridge Replacement	(Matching Ratio: 77.7/22.3)
65% On System	
15% Off System	
20% Optional	
Interstate Reimbursement	(Matching Ratio: 83.3/16.7)
Discretionary	(Matching Ratio: 83.3/16.7)
Statewide Planning	(Matching Ratio: 80.0/20.0)
Metropolitan Planning	(Matching Ratio: 82.8/17.2)

These ratios change and should be verified with the Business Office before entering data in Trans*port.

Resource Allocation

For state transportation purposes, the State of Colorado is divided into several different geographic regions. There are 11 Transportation Commission districts, six CDOT Engineering Regions, nine Maintenance Sections, 15 Transportation Planning Regions including the five Metropolitan Planning Organizations, and more than 300 local cities, towns and counties.

Historically, the Transportation Commission has allocated the available revenues to the six CDOT Engineering Regions

Statewide Programs

The Transportation Commission elected to fund "Statewide Programs" as an off-the-top revenue allocation to the following programs:

- Surface Treatment Program
- Bridge Program
- Rest Area Program
- Small Urban Area Program
- Safety Program
- Maintenance Program
- ITS Program
- CDOT Operation Program

Regional Programs

The Transportation Commission allocated funding to "Regional Programs" including:

- Other Regional Priorities
- Metro Planning
- Enhancement
- Congestion Mitigation/Air Quality Funds

All remaining funds are allocated to the six CDOT Engineering Regions based on a

revenue distribution formula for the Other Regional Priorities program. Metro Planning has been allocated statewide based on the federal funding level. Enhancement funds were allocated to the six CDOT Engineering Regions based on a revenue distribution formula after a statewide allocation was made for program administration.

Special Funding Sources

From time to time the Transportation Commission establishes special funding sources, for example, the 7th Pot.

Program Implementation

Resource Allocation for the Statewide Long-Range Plan is implemented through the 20-year Long Range Plan “control total” planning allocations approved by the Transportation Commission.

Program details can be found at <http://internal.dot.state.co.us/ofmb/>.

1.07 PROJECT FINANCES

ProMIS is used to budget and obligate funds for all phases of projects.

Description

The ProMIS Description screen is created early in the life of the project. The project number and code are assigned by the Office of Finance, Management and Budget (OFMB). The project number is the alpha, numeric number used primarily by engineers and the FHWA in project identification. The project code is a five-digit sequential control number for project accounting purposes. The ProMIS manual appendices provide an explanation of the designations of a project number.

Although the Business Office will have completed a number of fields on the Description screen, there are some fields that the Resident Engineer can best complete such as beginning and ending reference points. It is important that this information be accurate as it may have direct impact on the budgeting and eventual charges that impact the project.

The Resident Engineer should review the ProMIS Description screen and inform the Business Office of any revisions.

Initial Budget

The Resident Engineer should refer to the Statewide Transportation Improvement Program (STIP) in deciding how much to fund each phase. The main phases are design, right of way, utilities, construction and miscellaneous. The STIP will indicate the provider -- who will be providing the funds -- which can be federal, state or other. The fiscal year will be the year the phase is listed in the STIP.

The Business Office will input a brief justification to accompany every budget request. Commonly, the justification is written by the Resident Engineer, Region Program Engineer, Region Transportation Director or OFMB.

Although one project usually covers all phases, sometimes the Resident Engineer decides to create multiple projects under one STIP number. For example, the Resident Engineer may create a project for design and a separate project for construction. The Resident Engineer should confer with the Business Office to ascertain if there will be any benefits or deterrents to fragmenting the STIP line item into more than one project.

Formal Budget

For an outline of when a project can or must be re-advertised, see Section 8.25 of this manual.

At the time of award, the Resident Engineer can obtain a financial overview of the project in Probe. At this time, the budget will have been "made whole," that is adjusted

for any deficits in previous phases.

The approved Commission Budget and Allotted Percent of that budget are at the bottom of the ProMIS Budget screen. At the time of award, the Resident Engineer should be able to tie the ProMIS budget to the Probe statement. If the Resident Engineer cannot reconcile the numbers, he should contact the Business Office.

The Approved Commission Budget level is significant in determining the number of authorized actions over the life of a project. It is from this dollar amount that the 10 percent will be computed for determining if Chief Engineer approval is required for project award during the project bid process. It is also from this amount that the 15 percent will be calculated to establish if Transportation Commission Action is required to increase the project budget or for award of a project at bid.

Any request for additional budget greater than 15 percent of the approved Transportation Commission budget will be processed through a budget supplement action, which occurs on a monthly basis.

If the budget request is less than 15 percent of the Transportation Commission approved budget, OFMB may approve the request as an "allotment advice." Allotment advices include transfers to projects from pools or other projects. Allotment advices are usually processed within a few days' time.

The Business Office can offer advice and assistance on any part of the budgeting process.

Obligation

Obligation of funds is as important as the budgeting. In fact, the funds cannot be spent until they are obligated.

Each phase will show on the ProMIS Obligation screen with the requested provider (type of funds) and below that the phase start date. Funds in the first column title Unobligated mean the dollars have been requested by the Region. There is absolutely no guarantee that the funds will be approved.

The Intransit field means the dollars have been requested by OFMB. The Resident Engineer can feel fairly comfortable that the funds will be approved, providing all the necessary engineering type documents have been done correctly. Charges should not be made against a phase until the funds move to the Approved column and the phase start date has been met.

The Total Expenditures shows the total amount spent to date. The encumbered amount shows dollars that have been committed. An encumbrance is a contractual commitment. The Resident Engineer needs to refer to the contracting document to ascertain if CDOT is required to pay every penny in the contract or only pay to a certain benchmark. For example, many contracts are written that the contract is completed

when the work is done, not the total dollars spent. The Unspent Obligation Request shows the total amount remaining in the project – the beginning dollars by phase less expenditures and encumbrances to provide the available dollars.

The federal quarters run October-December, January-March, April-June and July-September. Moving obligation on federally funded projects within a quarter usually does not create a problem; however, moving obligation to another quarter can create a number of scheduling issues and, again, requires advance planning with the Region Program Engineer, Planners and Business Office. For example, accelerating an advertisement date from January to December is moving from one quarter to another.

Authorization and obligation now are simultaneous. If the funds are obligated, they are authorized.

Information

In particular, the key roles need to be correct on the ProMIS Information screen. The people listed on this screen are the ones called by the Business Office, the Center for Accounting, OFMB and the Center for Procurement Services when there are problems or issues. Equally important, the organization codes need to be correct so that financial data queues to the proper Residency on reports. If the Resident Engineer is not certain of the correct cost centers to list on this screen, the Business Office should be able to assist.

Crucial Dates

Showing on the ProMIS Budget screen are phase start dates. The Resident Engineer needs to notify both the Region Program Engineer and the Business Office to changes in the advertisement date that move it out of the quarter. If the project has federal funds and the advertisement date moves to another quarter, the Business Office will need lead time to work with OFMB to receive approval from FHWA. OFMB prefers to submit amendments to the obligation plan only once midquarter. As soon as the Resident Engineer becomes concerned that the project may need to be included in an amendment, the Resident Engineer needs to talk with both the Region Program Engineer and the Business Office.

Supplementing the Budget

There are many reasons that project budgets need to be supplemented, including additional work or overruns. In those instances, the Resident Engineer needs to work with the Region Program Engineers and the Business Office to find sources.

Many requests to add funds to a project don't require Transportation Commission approval or amendment to the obligation plan. However, in those cases that do require Transportation Commission approval, the Resident Engineer needs to be aware that supplementing a project can take months. The Transportation Commission meets only once a month, usually on the third Thursday. OFMB needs several weeks' lead time before presenting requests to the Commission.

The Resident Engineer needs to be aware that the Region prefers to make as few presentations to the Transportation Commission as possible on any given project; therefore, the engineer needs to be seeing the big picture. If there is any likelihood that several phases such as utilities and right of way are going to run over budget, both requests should be calculated and communicated to the Region Program Engineer as soon as the Resident Engineer has solid figures.

Day-to-Day Financial Management

One of the more challenging aspects of project management is managing the day-to-day finances.

The Resident Engineer needs access to ProMIS (budgeting system), FSS (the financial reporting subsystem), and COFRS (the Colorado Financial Reporting System). The Resident Engineer needs to submit the Form 984, Network Computing Services Request (<http://internal/ccsu/forms/ncs.doc>), to obtain access to these programs.

The Resident Engineer needs to be aware of CDOT purchasing requirements, rules and directives. State Procurement, CDOT Procurement and the Center for Accounting offer training applicable to the financial aspects of running a project.

There are a number of ways that money can be spent but predominately most transactions on a project are through encumbrances created in COFRS, intra/interagency vouchers, the procurement credit card, and employee reimbursements.

An encumbrance is a binding obligation to pay. The big dollar encumbrances against a project are the contracts created in the construction phase. Those encumbrances are created in COFRS by the Agreements Program in Project Development and the Center for Accounting as a part of the bid process.

Intra/interagency documents are created when a commitment is created to pay or be paid by either another state agency or a cost center within CDOT. The Resident Engineer is not always aware that these documents are being created. If the Resident Engineer should unexpectedly find one of these documents on the monthly cost ledger, the Business Office should be contacted for an explanation or to research the issue.

If the Resident Engineer needs services of a vendor that are outside of engineer/architect services, he needs to go through the Business Office and the Center for Procurement.

Encumbrance and project cost ledgers are available in the SyBase account by going to the Financial Subsystem, FSS application. The reports are updated after month-end close. The Resident Engineer can review these reports to ensure that the encumbrances are set up and liquidated (reduced) correctly. The reports can be reviewed to ensure that charges against the project are accurate and allowable. The

Resident Engineer should notify the Business Office of any journal entries that need to be processed.

The Resident Engineer is responsible that charges against his project are coded correctly; however, coding errors happen. The sooner they are caught and the Business Office informed to do journal entries, the more likely the Resident Engineer will be able to keep a handle on the project finances. The Business Office can be contacted for the code listing.

Usually, design charges up to advertisement are charged to the preliminary engineering project code (subaccount) or pool and after advertisement to the construction engineering pool.

The construction engineering pool catches “eligible” charges and applies them in a predictable manner to the projects. Non-allowable charges are called “non-participating indirects.” The Resident Engineer needs to understand when it is appropriate to code to the construction engineering pool.

Additional References:

1. <http://internal.dot.state.co.us/ofmb/> *OFMB Policy and Procedure Manual*
2. *COFRS User Manual*
3. *CDOT Project Management Information System (ProMIS) Manual*

1.08 FIELD SURVEY

A field survey is used to map the topography of a project within the extent of its proposed limits.

A field survey is usually required whenever a project consists of more than minor resurfacing. A field survey is appropriate when there are significant earthwork, reconstruction, new alignments, or structures to be constructed or extended. A field survey may be required when an overlay project includes slope flattening or guardrail installation. An adequate field survey is essential to a properly constructed project and is required for land acquisition on a project.

The full extent of the project limits must be determined by the Resident Engineer prior to the start of the field survey to eliminate multiple surveys and duplicate effort. Scoping is initially performed within the anticipated project area. For new or reconstruction projects, project scoping may be an extensive study of the area.

At the project scoping meeting, the Form 1217a, Preliminary Survey Request, should be used as a tool to ensure that all issues are addressed at the meeting, and a draft Survey Request should be a product of the Design Scoping Review. Sufficient advance notice prior to the start of a survey is required to obtain permission to enter property outside the highway right of way. When a survey consultant firm is to do the survey on a project, the Resident Engineer will need to allow time to select and finalize the contract with the firm. A presurvey conference should be conducted prior to any fieldwork being done on the preliminary survey.

The Resident Engineer is responsible for including the Survey Coordinator in the Design Scoping Review and to discuss issues relevant to any survey requirements. The Resident Engineer should finalize a survey request within 30 days of the Design Scoping Review. The Survey Request is a product of the Design Scoping Review, and includes input from the Resident Engineer and all the affected disciplines.

The Region Survey Unit or survey consultant firm will conduct and document the field survey on highway projects including the following:

1. Research and gather information for a pre-survey conference including existing surveys, mapping, as-constructed plans, and information from other entities.
2. Conduct the pre-survey conference to establish ground rules to be followed through all survey activities.
3. Gain access to private property, if required, through the use of Form 730, Permission to Enter Property, for the purpose of surveying.
4. Establish ground controls, XYZ coordinates, install monuments, for use in right-of-way purchases, staking of parcels, and easements.
5. Compile XYZ data on the T-MOSS computer program format and produce

contours on a topographic map.

6. Schedule and obtain a review by a professional land surveyor.
7. Prepare survey report and/or submittals.
8. File the control diagram in the survey plat depository with the appropriate county, and file monument records with the Colorado Board of Registration for Professional Engineers and Professional Land Surveyors.
9. Sign, seal, and file the right-of-way plans with appropriate county.

Additional References:

1. *CDOT Survey Manual*
2. *CDOT Procedural Directive 512.1, Project Scoping and Design Scoping Review (DSR)*
3. *Memorandum of Understanding with the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors (attached)*
4. See Appendix A for forms

MEMORANDUM

DEPARTMENT OF TRANSPORTATION

4201 East Arkansas Avenue
Denver, Colorado 80222
(303) 757-9011



Date: January 24, 1995

To: Region Transportation Directors

From: Edward M. Tormohlen

A handwritten signature in cursive script that reads "Edward Tormohlen".

Subject: Memorandum of Understanding with State Board of Registration

Attached is a copy of the revised memorandum of understanding with the State Board of Registration for Professional Engineers and Professional Land Surveyors. The revised memorandum was executed by the Board on January 13, 1995 at their regular meeting.

Please note that many items have been clarified in the memorandum thanks to the cooperative effort of the Region Preconstruction Sections, the Survey Coordinators in each Region, and the Attorney General's Office.

cc: Siebels
Reisbeck
Robinson
Mauro
Cramer
Vermilyea
O'Loughlin
Region Preconstruction Engineers
Region Construction Engineers
Region Right of Way Supervisors
Region Survey Coordinators

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE COLORADO STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS
AND PROFESSIONAL LAND SURVEYORS
AND
THE COLORADO DEPARTMENT OF TRANSPORTATION

Purpose

The purpose of this memorandum is to clarify the policies and practice of professional land surveying within the Colorado Department of Transportation.

Applicability

This document amends the Memorandum of Understanding executed by the Colorado Department of Transportation and the Board of Registration for Professional Engineers and Professional Land Surveyors, first dated July 1, 1985.

Definitions

1. "Aliquot Corner" as defined by CRS 38-51-102(2) (1994) means any section corner or quarter section corner and any other corner in the public land survey system created by subdividing land according to the rules of procedure set forth in CRS 38-50-101 (1994) and the Manual of Instructions for the Survey of Public Lands of the United States, 1973.
2. "Preliminary Survey" means a land survey conducted by or for the Colorado Department of Transportation establishing a land survey control in the field which is used to tie suspected or unconfirmed aliquot corners, boundary evidence, monumented property corners, existing right of way markers, and topography for the purpose of locating and restoring real property boundaries (as per CRS 12-25-202(6)). A preliminary survey falls within the statutory definition of professional land surveying as set forth in CRS 12-25-202 (1994).
3. "Land Survey" as defined in CRS 38-51-102(11) means a series of observations and measurements made by a Professional Land Surveyor pursuant to CRS 38-51-103 (1994), 38-51-104 (1994) and 38-51-105 (1994) for the purpose of locating or restoring any real property boundary.

4. "Right of Way Plan" means a land survey plat showing the land survey control in relation to aliquot corners, property lines, found monuments, relevant topography and an irregular parcel, defined and described for the purpose of Right of Way Acquisition, which shows all of the information required by CRS 38-51-106 (1994).
5. "Right of Way Marker" means a monument set by the Colorado Department of Transportation used to define the Colorado State Transportation boundaries in the field (as per CRS 38-51-104). These markers are not to be confused with aliquot corners or corners which define the intersecting property lines with the highway boundary.
6. "Monument Record" as defined by CRS 38-53-103 (14), means a written and illustrated document describing the physical appearance of a survey monument and its accessories or of a bench mark.
7. "Irregular Parcel" as defined by CRS 38-51-103 (10) means a parcel of land which is not uniquely defined on a subdivision plat but which is described by any of the following methods:
 - A. a metes and bounds description;
 - B. a book and page or reception number reference;
 - C. any so called "assessor's tract"; or
 - D. a description which calls only for the owner's or adjainer's name.
8. "Land Survey Control" means a network of control corners established by the Department of Transportation as per CRS 38-51-102(6).
9. "Land Survey Control Diagram" means a diagram used to illustrate the monuments found or established by the land survey control in relationship to the right of way or any land boundary, which shows all of the information required by CRS 38-51-106.
10. "Written property description" means a general description of the location of a property surveyed which meets the requirements of CRS 38-51-106(1) (i) and may contain a reference to a recorded written legal description.

Compliance with Colorado Statutes

The provisions of Articles 50, 51, 52 and 53 of Title 38, and Article 25, Part 2 of Title 12, of the Colorado Revised Statutes, as amended, apply to the Colorado Department of Transportation's practice of land surveying. It is the intent of this memorandum to bring the Colorado Department of Transportation into full compliance with the state statutes and Board Bylaws and Rules of Procedure and Rules of Professional Conduct. The Colorado Department of Transportation shall continue to have the following duties performed under the control and direction of a Colorado licensed professional land surveyor:

1. Establishing land survey control from which the right of way or any land boundary will be calculated, described or monumented.
2. Establishing ties to aliquot corners and restoring, resetting or upgrading aliquot corners according to Board rules.

3. Setting of right of way markers in accordance with CRS 38-51-104 and CRS 38-53-105. Right of Way markers shall be set not more than 1400 feet apart along any straight boundary line as well as at all angle points, at the beginning, end, and points of change of direction or change of radius of any curved boundaries defined by circular arcs. Right of Way markers must bear the stamp of the professional land surveyor in responsible charge of the work.
4. Referencing out and resetting of aliquot corners disturbed by construction. If the corner falls within the traffic area of a highway, the top of the monument shall be placed one-half foot below the roadway surface, and the monument shall be provided with a monument box, the top of which shall be set nominally flush with the surface of the pavement.
5. Preparing and reviewing of right of way plans or any other type of property boundary plans or legal descriptions from data collected by the field surveyors.
6. Filing of monument records with the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors and County Clerk's office as required by CRS 38-53-104. A monument record must be sealed by the land surveyor in responsible charge of finding, establishing, resetting or upgrading the monument. Pursuant to CRS 38-53-104 a monument record shall be filed on all aliquot corners found, upgraded according to Board rules or reset.
7. Land survey control diagrams shall be deposited in the appropriate county office in accordance with CRS 38-50-101 and 38-51-107 (1994).
8. Right of way plans shall be deposited in the appropriate county office in accordance with CRS 38-50-101 and 38-51-107 within six months of right of way monumentation.
9. Maintaining historical data on all land surveys and row plans made by the Colorado Department of Transportation.

Further Understanding

1. The Colorado Department of Transportation shall comply with CRS 38-51-104 which requires that "The corners of lots, tracts, or other parcels of land, all aliquot corners, and any line points or reference points which are set to perpetuate the location of any land boundary or easement shall, when established on the ground by a land survey on and after July 1, 1975, be marked by reasonably permanent markers solidly embedded in the ground. Affixed securely to the top of each such marker shall be a durable cap bearing the Colorado registration number of the professional land surveyor responsible for the establishment of said marker."

2. The Board acknowledges the Department of Transportation's determination that the Department is not required to monument uneconomic remnants, excess rights of way or maintenance sites when no land survey has been performed to locate the boundary of uneconomic remnants, excess rights of way, or maintenance sites.

3. The Board further acknowledges the Department of Transportation's determination that the Department is not required to monument remainder tracts, unsurveyed easements or ownerships inside or outside of the Department's Right of Way lines.

4. The Board does not intend to take any legal action to require the Department to monument these remainder tracts or ownerships unless the facts of a specific case give rise to a need for monumentation for public protection purposes. If such a special case arises, the Board will contact the Department to coordinate a cooperative effort as the first action toward solving the problem.

STATE BOARD OF REGISTRATION FOR
PROFESSIONAL ENGINEERS AND
PROFESSIONAL LAND SURVEYORS

STATE OF COLORADO
DEPARTMENT OF
TRANSPORTATION

BY Marie M. Milliken
MARIE M. MILLIKEN, Ph.D.
Board Chair

BY James E. Siebels
JAMES E. SIEBELS, PE
Acting Chief Engineer

Date: 1/13/95

Date: Dec 9, 1994

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1.09 DESIGN DATA (FORM 463A)

The Form 463a, Design Data, which is completed in ProMIS, is used on all CDOT projects to document important design information and provide uniform information during the preconstruction process.

Also, authorization for construction is not made until a final Form 463a and the Form 1180, Standard Certification and Projects PS&E Approval, or a summary of the engineer's estimate are submitted to OFMB. The Form 1180 is required on all projects that do not have Federal Highway Administration (FHWA) oversight. Projects cannot be advertised for bid until the construction phase is authorized.

Design data on the Form 463a includes, but is not limited to:

- Traffic volumes
- Geometric standards
- Project characteristics
- Right-of-way issues
- Railroad crossings
- Agency coordination
- Entities involved
- Structural road parameters
- Major structures
- Highway classification
- Utilities
- Environmental category
- Construction information

The Resident Engineer should begin the Form 463a during the scoping process. When a project reaches the Field Inspection Review stage, the information on the preliminary Form 463a should be complete and the Resident Engineer should not change the scope of work or extend the project limits. If it is necessary to revise the project limits or the scope of work, then the Form 463a must be revised. The Resident Engineer is responsible for determining whether the project is under CDOT or FHWA oversight. The oversight responsibilities are outlined in the Stewardship Agreement between the FHWA Colorado Division and CDOT or the Resident Engineer can contact the FHWA.

The Form 463a is used by the Region Planning/Environmental Manager to initiate the environmental clearance processes. Federal-aid projects and projects on the National Highway System shall comply with geometric and structural standards outlined in the *CDOT Design Guide*.

An important goal of the FHWA in conjunction with CDOT is to provide the highest practical and feasible level of safety on the transportation system and to reduce the number and severity of accidents on highways. A safety evaluation of highway sections within the project limits is required to assure hazardous features are not overlooked. The current CDOT design standards are detailed in the *Design Guide* and the *CDOT M&S Standard Plans*. The Form 463a compares the existing and proposed design criteria with the minimum standards acceptable for that particular type of roadway.

On the Form 463a, items that do not meet the design standards are to be identified by an asterisk and may require a variance (see Section 1.10 of this manual).

The Resident Engineer should determine accurate project limits, project description, and complete all applicable design data on the Form 463a to the fullest extent possible.

The Resident Engineer will check the form for accuracy and completion before submittal to the Region Program Engineer for approval.

The following steps describe the activities involved in the completion of a Form 463a:

1. Initiate ProMIS budget and obligation (see Section 1.07 of this manual).
2. Conduct the Design Scoping Review (see Section 8.09 of this manual).
3. Prepare the preliminary Form 463a within 30 days after the Design Scoping Review for distribution to users and for action on any exception to design standards.
4. Complete the final Form 463a and obtain the Region Program Engineer's approval.

The original, signed Form 463a is to be sent to the Records Center at Headquarters by the Resident Engineer. Preliminary, final and revised copies are distributed by the Resident Engineer as shown on the distribution list of the form, as needed. The FHWA should be sent a copy on all projects with FHWA oversight responsibility.

Additional References:

1. *CDOT F463 User's Guide*
2. *AASHTO Policy on Geometric Design of Highways and Streets*
3. *CDOT Procedural Directive 512.1, Project Scoping and the Design Scoping Review (DSR)*
4. *CDOT Project Management Information System (ProMIS) Manual*
5. <http://internal\dttd\dataaccess\index.html> or <http://dhqntw\dttd\dataaccess\index.html>
6. See Appendix A for forms

1.10 DESIGN EXCEPTION (VARIANCE) (FORM 464A)

The Form 464a, Design Exception Variance Request, is used to document a project design exception (variance). This form documents important decisions, mitigation and safety information required when minimum design standards, as identified on the Form 463a, Design Data, cannot be met.

The Resident Engineer will complete the Form 464a (or variance letter) for each CDOT project when substandard features or design exceptions exist on the project. However, when possible the Resident Engineer should avoid design variances. The Region Program Engineer approves the Form 464a; projects that have federal oversight require Federal Highway Administration (FHWA) approval.

Measures for mitigating the reduced design standards should be presented and decisions discussed. The accident history for the exception area should be considered. The cost differential for the project with the design exception should be compared to the estimated cost for constructing to full standards.

The Form 464a should be completed and approved at the earliest practical point in the design process to allow approval by the Region Program Engineer and by the FHWA on federal-oversight projects. Federal oversight is explained in the Stewardship Agreement between the Federal Highway Administration, Colorado Division, and the Colorado Department of Transportation.

All variances should be identified by the Field Inspection Review and approved prior to the Final Office Review. Early submittal will allow time to incorporate comments and concerns, and to collect any additional supporting data and analysis. Untimely submittal for approval of design variances can result in costly delays to the project.

The Design Scoping Review provides a design data scoping process; and upon completion, prior to or concurrent with the Form 463a, will identify the existing criteria status and if any exception to the minimum criteria requires further action. The following controlling design criteria require a documentation of a variance whenever the standard values are not met.

- | | |
|----------------------------|--|
| 1. Design speed | 8. Grade |
| 2. Lane width | 9. Cross-slope |
| 3. Shoulder width | 10. Superelevation |
| 4. Structural capacity | 11. Horizontal clearance (except clear zone) |
| 5. Horizontal alignment | 12. Vertical clearance |
| 6. Vertical alignment | 13. Bridge width |
| 7. Stopping sight distance | |

Guardrail and bridge rail are to be designed according to the latest CDOT M&S

Standard Plans on all new construction and reconstruction projects. For 3R and surfacing type projects, guardrail is to be handled in accordance with *CDOT Procedural Directive 548.1, Safety Considerations for Resurfacing and 3R Type Projects*.

A variance also can be prepared in written format, as a letter to the project file, or as a supplement to the Form 463a, as long as all substandard criteria are addressed. This documentation is often referred to as the Variance Package. All additional supporting documents should be attached. If items in addition to those listed above are determined to be exceptions to standards, they are to be handled on a project basis.

The FHWA may approve design exceptions on federal-aid projects for experimental features or where conditions warrant an exception.

Determination to approve a project design that does not conform to the minimum criteria is to be made only after due consideration is given to project conditions and safety benefits for the dollar invested, compatibility with adjacent sections of roadway and the probable time before reconstruction of the section due to increased traffic demands or changed conditions.

Entities and consultants should discuss the variance request with the Resident Engineer to determine feasibility of approval and possibility of project delays. The FHWA should receive an invitation to the Field Inspection Review meeting with the variance denoted on National Highway System and federal-oversight projects.

Off-system projects may not have historical accident data and roadway safety inventories. However, accident records may be available from the Safety and Traffic Engineering Branch.

When the criteria on Form 464a are properly discussed, the minimum FHWA requirements for preparing the variance request are satisfied. Additional comments can be added to clarify items. No separate variance transmittal letter is necessary when Form 464a is used.

The following items do not require a variance, but should be documented as a design decision.

1. Reduction in existing roadway elements where the roadway still meets the minimum in *The AASHTO Policy on Geometric Design of Highways and Streets* or appropriate CDOT standard (does not apply to rehabilitation projects).
2. Changes to the *CDOT M&S Standard Plans* are handled on a project basis. However, changes to FHWA policy, such as crash-tested bridge rail, may require a variance, as stated in the policy.

The Resident Engineer shall identify substandard design features based on the Form 463a. Substandard features will be described on the Form 464a, along with the rationale for the exception. Mitigation measures, accident data, and cost analysis for

any substandard feature must be explained.

The FHWA stresses two requirements concerning design standards on federal-aid projects. These requirements, which are mandatory unless exceptions are specifically noted, are:

1. Description/controlling criteria must be identified in the project files. These criteria concern the present condition of the roadway and safety features. Any corrective action or proposed improvements needed relative to these criteria should be documented. Such documentation must be available to the FHWA for reference.
2. FHWA concerns must be reasonably addressed in any variance justification request sent to the FHWA for its approval. The FHWA may not approve a request that does not provide enough information and detail to satisfy its concerns about the safety and design improvements provided, and/or the opportunity to provide such features. The Form 464a meets these requirements.

The Form 463a prompts the preparer to compare the existing and proposed design criteria with the minimum standards acceptable for that particular type of roadway. It is important that the appropriate reference source for the standard be identified on the Form 463a and Form 464a, and that both forms cite the same references. In general, the reference will depend on the type of federal program, functional classification of the roadway, and/or design elements considered.

A current listing of AASHTO publications that provide valuable information for obtaining good design are in 23 CFR Part 625.

The documentation and procedures for preparing a design exception request are as follows:

1. Identify the exception to the design standards within at least 30 days after the Design Scoping Review but prior to the Field Inspection Review. The Resident Engineer should discuss the status of variance approval at the Field Inspection Review.
2. Prepare a preliminary Form 463a and indicate all exceptions to design standards.
3. Prepare a Form 464a (or letter) with a description of all exceptions, justifications, costs and proposed mitigation. When supporting information is not available, a statement should be included showing that such data is not collectable. As much information should be provided as can be reasonably researched by the Resident Engineer. If criteria cannot be addressed, "Not Available" should be noted with applicable reasoning. The remarks should include the effort made to obtain the information.
4. The following type projects may not be required to meet full AASHTO standards but must meet the minimum standards in the appropriate sections of the *CDOT Design Guide*, or a variance will be prepared:
 - a. 3R projects -- see the *CDOT Design Manual* and *Procedural Directive 548.1*.

- b. Corridor projects -- see *The CDOT Design Manual*, *The AASHTO Policy on Geometric Design of Highways and Streets*, and *The CDOT Design Guide* for those sections that apply to the classification of roadways not on the National Highway System.
- c. Safety type projects.

When evaluating existing conditions on safety type projects, the 3R project standards may be used to determine whether minimum roadway criteria have been met. The Resident Engineer should consider safety and hazard potential in deciding whether a higher standard is more appropriate. For example, new bridge and guardrail shall meet full standard and appropriate rail crash-testing requirements, but the approach roadways may be evaluated against the 3R standards. The Resident Engineer must use judgment in deciding whether to provide additional improvements and decisions should be documented. Although the scoping process may not be extensive on non-federal aid and state projects, the approval of a variance and the recommendation to prepare a safety letter may be applicable.

5. Projects with federal-aid oversight and Interstate projects require FHWA approval.
6. For projects by outside agencies or consultants, the Region will review the variance request to determine whether the intent of the Form 464a is satisfied.

It is necessary that all affected organizations be informed of the progress made toward obtaining approval of any variance. These organizations include local agencies, consultants, and CDOT branches.

Additional References:

1. Section 1.09, Design Data
2. Section 8.09, Design Scoping Review
3. *CDOT Procedural Directive 512.1, Project Scoping and the Design Scoping Review (DSR)*
4. FHWA Technical Advisory No. T 5040.28, 10/17/88, Developing Geometric Design Criteria and Processes for Non-Freeway RRR Projects at:
<http://www.fhwa.dot.gov/legregs/directives/techadvs.htm>
5. Transportation Research Board, TRB Special Report 214
6. See Appendix A for forms

1.11 PROJECT SCHEDULE

A project schedule is prepared to monitor the progress of preconstruction activities and to determine a reasonable timetable for advertisement date on all projects.

The project schedule is developed by the Resident Engineer to monitor important events and activities required to complete the design, right-of-way acquisition, utilities work and other associated tasks required to finalize design of a project. The Resident Engineer will monitor the schedule to ensure important dates are met to successfully advertise the project.

The Resident Engineer should give priority attention to critical path tasks that can require considerable time such as right-of-way acquisition, complex bridge design, consultant selection, environmental investigations, local agency agreements, utility/railroad agreements, and hazardous materials.

ProDates is used to establish the project schedule and milestones. Using ProDates, the Resident Engineer and the Specialty Units can coordinate production milestones for completion of assigned tasks.

The Resident Engineer needs to consider the availability of funds when determining schedules. For example, preliminary engineering should not be started until funds have been budgeted and obligated for the design phase, and a project may not be advertised until funds are available, particularly if federal aid is involved. In addition, local agencies often provide funds, and their processes and time constraints for providing these funds have to be considered.

The Resident Engineer will develop the project schedule and coordinate project progress with the project design team and all affected parties. The project team will be informed of activity schedule changes and accomplishments in order to coordinate plan development. Strategies for resolving critical path activity delays are to be recommended and solutions to conflicts developed. The Resident Engineer will inform affected parties of any changes to the schedule and adjustment to the advertisement date.

Project scheduling includes the following:

1. Conduct the project design scoping prior to preliminary design by initiating a Design Scoping Review.
2. Develop a proposed project schedule, preferably within 30 days after the Design Scoping Review.
3. Coordinate and monitor the project schedule with other appropriate milestones such as survey Field Inspection Review, Final Office Review, and advertisement date, and track such changes in ProDates.

4. Determine funds are available for each phase of project development.

The project schedule can be recorded on the network or personal computer using an assortment of software programs.

In addition, ProMIS (the budgeting system) is used to record information related to project scheduling such as:

1. Project data
2. Project milestones
3. Financial data (budget, obligation, expenditures)
4. Project description and location
5. Project comments

Additional References:

1. *CDOT Project Manager's Manual*
2. *CDOT Procedural Directive 512.1, Project Scoping and the Design Scoping Review (DSR)*
3. *CDOT Project Management Information System (ProMIS) Manual*
4. <http://internal.dot.state.co.us/ofmb/> *OFMB Policy and Procedure Manual*