PLANNING AND PROGRAM MANAGEMENT

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Overview

The Planning and Program Management Group is essentially comprised of four sections; Planning, Program Management, Project Management, and Project Scoping.

Planning merges land use planning with transportation systems plans to create a long range plan. In the urban areas, this is done in conjunction with other municipalities through the Metropolitan Planning Organization (MPO). The systems plans cover all the different modes; pedestrian, bicycle, transit, freight, rail, aviation and ports.

Program Management includes planning the program to address the most pressing needs, and managing the program to assure that they are addressed in the most timely fashion possible given the money at hand.

Most of the previous exam questions have been oriented towards Project Management and the activities of Project Scoping.

Project Management

The heart of Project Management is developing an agreement that defines the Cost, Schedule, Scope and Quality of a project; the CSSQ Agreement. The Scope is defined by the technical documents and the Department prepares for the management control points; Scope Closure, Design Approval, and PS&E. This includes Expanded Project Proposals (EPPs), Design Approval Documents (Design Reports, Environmental Assessments, or Environmental Impact Statements), Advanced Detail Plans (ADPs), Specifications and Estimates (PS&E) packages.

The cost is defined by a fiscal plan. This includes the costs necessary for Design, Right-of-Way preparation (incidentals), Right-of-Way Acquisition, and Construction Inspection, as well as the construction cost.

Project schedules are documented in a Project Management Plan (PMP). Sophisticated PMPs are detailed critical path analyses. The time required for each task and the relationship among the tasks is determined. Some tasks need to be finished before others can start, others can be done at almost any time. The shortest time required to deliver the product is called the Critical Path. If any task on the Critical Path is not done on schedule, the project schedule will “slip.” On the other hand, tasks that are not on the Critical Path have “float” time. For example, a one month task can be done any time in a six month period. This task has five months to “float.”

Project Scoping

Project Scoping defines the needs in the area of a proposed project, establishes the objectives for the project, sets the Design Criteria, defines the alternates that warrant further evaluation in Design, and verifies the assumed construction and ROW costs.

Two technical activities are the province of the Project Scoping Unit, traffic forecasting and capacity/level of service analysis. Both of them have traditionally generated exam questions.

Traffic Forecasting

There are three methods of forecasting traffic: growth rates, trip generation, and traffic modeling.

The growth rate method is the faster and the least accurate. Either the statewide average growth rate is used, or the rate that is specific to the project area is developed. The statewide average growth rate is reviewed and updated regularly by the Main Office. It is based on a comparison of current annual average daily traffic (AADT) volumes to historical data. Measured as vehicle miles of travel (vmt), the growth usually runs in the range of 1.5 to 2% per year. The Department also has a "Rural Traffic Forecasting Method." This computer program uses the projected growth of population and households in the project area to develop a more specified growth rate. The existing traffic is multiplied by the growth rate to forecast traffic 10, 20 or 30 years into the future.

Trip generation is used when specific development has to be taken into consideration. For example, each household is expected to generate about 3 auto trips per day, retail sales generates a certain number of trips per square foot of floor space, industrial developments generate a certain number of trips per employee. The planned development is determined by the developer, or the local Planning Board. Trip generation rates (and time of day assumptions) are obtained from the Institute of Traffic Engineers (ITE) Trip Generation Handbook. Daily and hourly volumes can then be computed. After making some assumptions about origins and destinations, these trips can be added to the existing traffic.

Computerized traffic modeling is used when a large area and/or multiple developments are involved. The highway system is represented by a series of "links" between "nodes" which are essentially intersections. Basic characteristics of the links and nodes (number of lanes, speed limits, signal cycles, etc.) are input to the model. The surface of the area is cut into a number of "zones," both within the study area and external to it. Trip generation is done (as above) for both the existing and future conditions in each one of the zones. The results are tabulated into a "trip table" showing the type of trips being produced and attracted in each zone. Trip characteristics (time of day, average length, auto occupancy, etc.) are also input to the model. The model loads the trips onto the network, and assigns them the fastest route between the production and the attraction (home to work for example.) While the trips are being assigned, the computer figures out what the effect those trips had on travel speeds over the links. The next batch of trips is loaded onto the network, but the network now has revised travel speeds. Different routes will now appear faster, and will receive more trips. The model continues doing this until all the trips are assigned to the network.

A calibration run is the first attempt. Using existing conditions, the model is supposed to replicate what is really happening. The results are checked at "cordon lines" and at "screen lines." Cordon lines are concentric circles around the core of the study area. Traffic counts are taken at all of the cordon crossings, and compared to the model results at all of the cordon crossings. If the distribution among the cardinal directions approximates reality, the model is working well, even if the order of magnitude is off. This can be corrected with a simple factor either manually or applied universally to the model. Screen lines are then used to check the results in various corridors. Where two or more lines serve the same purpose, the modeling process may not assign trips in the right order to effectively model each individual facility. However, if the order of the magnitude or the corridor is reasonable (off by the same factor as the cordon lines) the model is working well.

Capacity and Levels of Service (LOS)

Capacity is the theoretical amount of traffic a roadway can carry. It is generally measured in passenger cars per hour (pcph) for two lane roads, and pcph per lane (pcphpl) for multi-lane highways. It is heavily influenced by; intersections, number of lanes, % of heavy vehicles, terrain, lane width, lateral clearance and, in the case of two lane roads, the directional split and passing opportunities. Generally speaking the capacity of:

two lane roads = 2000 - 2800 pcph and multi-lane roads = 2000 pcphpl.

Levels of service range from A to F; A being the best when drivers are not influenced by other vehicles, and F being the worst, forced flow or "jammed." LOS is measured by speed, volume to capacity (v/c) ratio, and service flow rate. LOS D is generally considered acceptable. Vehicle speeds are relatively unaffected, and it accounts for 80 - 90% of capacity. Levels of service for intersections are measured in terms of the "average stopped delay" per vehicle over a 15 minute analysis period.

The following two pages are excerpts from Transportation Research Board (TRP) Special Report 209, the Highway Capacity Manual. They show the relationship between speed, v/c ratio, and service flow rate for freeways, multi-lane and two lane highways. LOS for intersections is explained on the second page.

Congestion Mitigation

Along with the traditional "highway widening" concept, there are a number of other methods for relieving congestion. Transportation systems management (TSM) reduces congestion through actions such as: adding turn lanes, coordinating signals, reducing "conflict points" such as driveways, creating service roads, interconnecting parking lots, etc. Transportation Demand Management (TDM) actions are targeted at changing driver behavior. Encouraging the use of transit and ride sharing fit to this category. They are most effective when rewarded by the employer through preferred parking, reduced parking rates, transit subsidies, flexible work schedules, etc. These are generally called "employer based trip reduction strategies."

Intelligent Transportation Systems (ITS) is also being looked at for non-construction solutions. This arena includes real-time motorist information systems such as Highway Advisory Radio (HAR), the Internet, GPS based on-board trip planning software, variable message signs, and various incident management strategies.

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of *delay*. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria is given in Table 9-1.

Delay may be measured in the field, or may be estimated using procedures presented later in this chapter. Delay is a complex measure, and is dependant on a number of variables, including the quality of progression, the cycle length, the green ratio, and the *v/c* ratio for the lane group or approach in question.

Level-of-service A describes operations with very low delay, i.e., less than 5.0 sec per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level-of-service B describes operations with delay in the range of 5.1 to 15.0 sec per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level-of-service C describes operations with the delay in the range of 15.1 to 25.0 sec per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant in this level, although many still pass through the intersection without stopping.

Level-of-service D describes operations with delay in the range of 25.1 to 40.0 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high *v/c* ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level-of-service E describes operations with delay in the range of 40.1 to 60.0 sec per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high *v/c* ratios. Individual cycle failures are frequent occurrences.

Level-of-service F describes operations with delay in excess of 60.0 sec. per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high *v/c* ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Relating capacity and Level of Service

Because delay is a complex measure, it’s relationship to capacity is also complex. The levels of service of table 9-1 have been established based on the acceptability of various delays to drivers. It is important to note that this concept is not related to capacity in a simple one-to-one fashion.

In previous chapters, the lower bound of LOS E has always been defined to be capacity, i.e., the *v/c* ratio is, by definition, 1.00. This *is not the case* for the procedures of this chapter. It is possible, for example, to have delays in the range of LOS F (unacceptable) while the *v/c* ratio is below 1.00, perhaps as low as 0.75 - 0.85. Very high delays can occur at such *v/c* ratios when some combination of the following conditions exists: (1) the cycle length is long, (2) the lane group in question is disadvantaged (has a long red time) by the signal timing, and/or (3) the signal progression for the subject movement is poor.

The reverse is also possible: a saturated approach or lane group (i.e., *v/c* ratio = 1.00) may have low delays if: (1) the cycle length is short, and/or (2) the signal progression is favorable for the subject movement. Thus, the designation of LOS F *does not* automatically imply that the intersection, approach, or lane group is overloaded, nor does a level of service in the A to E range automatically imply that there is unused capacity available.

The procedures and methods of this chapter require analysis of both capacity and level-of-service conditions to fully evaluate the operation of a signalized intersection. It is imperative that the analyst recognize the unique relationship of these two concepts as they apply to signalized intersections.

REGION 3 PPMG ACRONYM LIST

Acronym	Description 11/96
********	**
CBD	CENTRAL BUSINESS DISTRICT
CMA	CONGESTION MANAGEMENT AREA
CMAQ	CONGESTION MITIGATION and AIR QUALITY FUNDING
CMO	CONGESTION MANAGEMENT ORGANIZATION
CMP	CRITICAL PATH METHOD
CSSQA	COST, SCHEDULE, SCOPE AND QUALITY AGREEMENT
EPP	EXPANDED PROJECT PROPOSAL
FM	FUNCTIONAL MANAGER
FMIS	FINANCIAL MANAGEMENT INFORMATION SYSTEMS
GIS	GEOGRAPHIC INFORMATION SYSTEMS
IPP	INITIAL PROJECT PROPOSAL
ISTEA	INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT
JM	JOB MANAGER
MPO	METROPOLITAN PLANNING ORGANIZATION
NEPA	NATIONAL ENVIRONMENTAL POLICY ACT

REGION 3 PPMG ACRONYM LIST

Acronym	Description	11/96
********	**	
PD	PROJECT DEVELOPER	
PM	PROJECT MANAGER	
PMP	PROJECT MANAGEMENT PLAN	
SEQRA	STATE ENVIRONMENTAL QUALITY REVIEW ACT	
SSM	SCOPE SUMMARY MEMORANDUM	
TCM	TRANSPORTATION CONTROL MEASURE	
TDM	TRANSPORTATION DEMAND MANAGEMENT	
TIP	TRANSPORTATION IMPROVEMENT PROGRAM	
TSM	TRANSPORTATION SYSTEM MANAGEMENT	

SAMPLE QUESTIONS:

How do you improve capacity on a 2-lane rural highway with lots of trucks?

ans. add lane on climbing side of steep grade and continue it to just over crest.

What effects the capacity of expressway most as it passes through urban area?

1) percent of through traffic
2) trip length
3) area activity and business
4) geometrics

What type of highway suffers most from steep hills and minimal passing sight distance?

ans. 2-lane

When determining the location for a new highway, the designer would:

1) use U.S. geographic survey
2) order photogrammetric maps
3) field reconnaissance survey
4) all of the above in that order

When determining the location for a new highway through an urban area, one could use the following steps. Put them in order:

1) traffic data at intersections
2) review a recent area planning study
3) review planning department data

ans. 3-1-2

Cordon line is defined as:

ans. Imaginary line that separates internal and external area of OD study

Intersections are classified how?

ans. At grade intersection, grade separation, interchange