Traffic Control Plans Design Manual

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Chapter 6
Traffic Control Cost Estimating
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TRAFFIC CONTROL COST ESTIMATING

6.0 – KEY POINTS OF THIS CHAPTER

How to complete a Cost Estimate, including:

- Identifying Pay Items.
- Managing Pay Items During Staging.
- Calculating Quantities.
- Assembling TP&DT Lump Sum Pay Item.
- Calculation Methods.

6.1 – TCP COST ESTIMATOR

ODOT has developed an Excel-based spreadsheet to help organize and manage traffic control devices, quantities, and costs. The use of the spreadsheet is not mandatory and should be considered as yet another tool available to Designers in developing their temporary traffic control plans.

The “TCP Cost Estimator” is available on the ODOT Traffic Control Plans Unit website. The file is updated on a regular basis, so download a new copy from the TCP Unit website before beginning your estimate.

Designers should be aware that the Cost Estimator does have some limitations. For very complex staging plans, it may be necessary to run through the process more than once to calculate quantities for a particular pay item.

In generating quantities, many of the calculations are rounded up to the nearest whole unit or the nearest factor of five. Some quantities include a percentage for the anticipated replacement of damaged devices. Some devices, however, require the TCP Designer to manually enter a percentage for replacement devices.

Read all Notes and Comments (‘mouse-over’) within the Cost Estimator before completing an estimate. All of the adjustments mentioned above are based on historical observations and the dynamic and widely variable nature of this discipline.

NOTE: The first worksheet of the Cost Estimator is titled, “INSTRUCTIONS – Read First”. Read this before using the Cost Estimator for the first time. If you have any questions or find errors within the Cost Estimator, please contact the Traffic Control Plans Unit.
6.2 – TRAFFIC CONTROL PLAN PAY ITEMS

A number of traffic control devices are used to assemble a traffic control plan. TCP Designers will quickly become familiar with the more frequently-used devices. This chapter hopes to introduce the extensive list of TCD, as well as information and practices available in calculating quantities for these devices.

The TCP Cost Estimator includes the temporary traffic control devices currently being used by ODOT (and most city and county agencies) within its highway construction contracts. Designers should become familiar with the technical *pay item name* for each item and their unit of measure.

- Temporary Protection & Direction of Traffic (TP&DT)
- Temporary Signs
- Temporary Barricades, Type II
- Temporary Barricades, Type III
- Temporary Guardrail, Type 2A, ReflectORIZED
- Temporary Guardrail, Type 3, ReflectORIZED
- Temporary Guardrail, Type 4 ReflectORIZED
- Temporary Guardrail End Pieces, Type B
- Temporary Guardrail Terminals, Flared
- Temporary Guardrail Terminals, Non-Flared
- Temporary Guardrail Transition
- Temporary Bridge Connections
- Temporary Concrete Barrier, ReflectORIZED
- Temporary Concrete Barrier, Tall, ReflectORIZED
- Moving Temp. Concrete Barrier (std. or Tall)
- Securing Temp. Concrete Barrier (std. or Tall)
- Temporary Steel Barrier, ReflectORIZED
- Moving Temp. Steel Barrier
- Securing Temp. Steel Barrier
- Mobile Barrier (includes Tractor & Trailer)
- Temporary Impact Attenuator, Sand Barrel System
- Temporary Impact Attenuator, Narrow Site System
- Moving Temp. Impact Attenuator, Sand Barrel System
- Moving Temp. Impact Attenuator, Narrow Site System
- Temporary Impact Attenuator, Truck Mounted (TMA)
- Repair Temp. Impact Attenuator, Narrow Site System
- Repair Temp. Impact Attenuator, Truck Mounted
- Repair Temp. Impact Attenuator, Sand Module
- Temporary Glare Shields
- Moving Temporary Glare Shields
- Reflective Barrier Panels
- Temporary Glare Screens
- Moving Temporary Glare Screens
- Pedestrian Channelization Device (PCD)
- Temp. Sidewalk Ramp, Parallel (w/ Landing & 90° Turn)
- Temp. Sidewalk Ramp, Perpendicular (Straight into St)
- Temp. Sidewalk Ramp, Constructed (ACP, PCC, Wood, etc.)
- Temp. Ped. Accessible Route (TPAR) Surface
- Bicycle Channelization Device (BCD)
- Surface Mounted Tubular Markers
- Replace Surface-Mount Tubular Markers
- Temporary Plastic Drums
- Temporary Delineators
- Temporary Reflective Pavement Markers
- Temporary Flexible Pavement Markers
- Temporary Removable Tape
- Temporary Non-Removable Tape
- Temporary Non-Reflective Tape (“Blackout”)
- Temporary Striping
- Temporary Pavement Legends
- Temporary Pavement Bars
- Stripe Removal
- Legend Removal
- Bar Removal
- Temporary Transverse Rumble Strips (TTRS)
- Temporary Illumination
- Temporary Traffic Signal
- Portable Traffic Signal
- Sequential Arrow Sign
- Portable Changeable Message Sign (PCMS)
- Overweight Vehicle Warning System (OVWS)
- Smart Work Zone System
- Radar Speed Trailer
- Flaggers
- ... etc.
6.3 – QUANTITY CALCULATIONS

In developing the cost estimate for a Traffic Control Plan, there are two important tasks to focus on:

- A complete list of TCP pay items (and accompanying Special Provisions).
- Adequate quantities for those pay items.

Having both the right type of TCD and sufficient quantities, helps avoid the need for inconvenient and often costly Contract Change Orders (CCO). Therefore, carefully compare the contents of their Special Provisions and plan sheets (if applicable), as well as the list of appropriate Standard Drawings, to the list of pay items in the TCP Cost Estimator. And, in confirming the complete list of devices, ensure that an adequate quantity has been provided in the TCP – including a small percentage as a contingency or to account for damage by traffic, vandalism, etc.

**TEMPORARY SIGNS**

One of the more important pay items is the quantity for Temporary Signs. Since every project will include some amount of temporary work zone signing, forgetting the pay item is not likely. However, not generating a proper quantity is very easy to do. Below is an excerpt from the list of Temporary Signs that are included on the “SIGNS” workbook within the Estimator.

<table>
<thead>
<tr>
<th>SIGN NAME / LEGEND</th>
<th>SIGN NUMBER</th>
<th>Width in.</th>
<th>Height in.</th>
<th>Size ft²</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEEPing OREGON ON THE MOVE (Rider)</td>
<td>With CG20-8 or CG20-8s</td>
<td>96</td>
<td>12</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>YOUR TAX DOLLARS AT WORK (Project Identification sign)</td>
<td>CG20-8</td>
<td>96</td>
<td>48</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>YOUR TAX DOLLARS AT WORK (Urban ID sign w/ &quot;ODOT&quot; Rider)</td>
<td>CG20-8</td>
<td>48</td>
<td>66</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>ROAD WORK AHEAD</td>
<td>W20-1</td>
<td>48</td>
<td>48</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>ROAD WORK AHEAD - (Smaller)</td>
<td>W20-1</td>
<td>36</td>
<td>36</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>BRIDGE WORK AHEAD</td>
<td>CW21-10</td>
<td>48</td>
<td>48</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>BRIDGE WORK AHEAD - (Smaller)</td>
<td>CW21-10</td>
<td>36</td>
<td>36</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>SHOULDER WORK</td>
<td>W21-5</td>
<td>48</td>
<td>48</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>SHOULDER WORK (Smaller)</td>
<td>W21-5</td>
<td>36</td>
<td>36</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>ON RAMP (Rider)</td>
<td>W13-4</td>
<td>36</td>
<td>36</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>NEXT XX MILES (Rider)</td>
<td>W7-3a</td>
<td>24</td>
<td>18</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ROAD WORK NEXT XX MILES</td>
<td>CG20-1</td>
<td>60</td>
<td>24</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>ROAD WORK XX MPH (New sign!)</td>
<td>CW20-1a</td>
<td>48</td>
<td>48</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>INTERMITTENT ROAD WORK NEXT XX MILES</td>
<td>CG20-13</td>
<td>60</td>
<td>36</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 6.0 – “SIGNS” worksheet*
It is important to remember the following when calculating Temporary Sign quantities:

- In multi-lane sections, a pair of signs – one on each side of the roadway, are needed for each direction.
- Sign supports and sign covers, installation, moving, reinstalling and removing are all included in the square-ft. cost of the signs.
- Route Shields are measured separately – even if installed on the face of another temp. sign.
- Examine Stages and Phases of the TCP carefully. Signs may be reusable from one Stage to the next and thus, a new sign is not needed – it can simply be moved to the new location needed for the next Stage. Make references on subsequent plan sheets back to earlier sheets where the same sign is used in the same location. For example:
  - **Sheet EB01**: Shows a “ROAD WORK AHEAD” sign at Sta. 125+00
  - **Sheet EB05**: A leader pointing to a post-mounted sign symbol at Sta. 125+00 says, “See Sheet EB01”
- The “SIGNS” worksheet includes blank lines for project-specific “custom” signs (e.g. “BAKER RD. DETOUR NEXT RIGHT”).
- An additional 5% is automatically added to Temporary Sign quantities at the end bottom

By providing a thorough list of temporary work zone signs from the MUTCD, the FHWA Standard Highway Signs (SHS) manual, and the ODOT Sign Policy & Guidelines, the Designer can use the Estimator like a checklist to capture a quantity for each individual sign needed for the project. The Estimator generates the total square footage quantity of temporary signs and adds a small percentage to account for damage, vandalism, oversights, etc.

**ACCOMPANYING TCD**

When a given TCD is normally accompanied by an additional device(s), the Cost Estimator automatically includes those devices. For example, per Standard Drawing TM800, for each Portable Changeable Message Sign (PCMS) placed on the roadway, six Plastic Drums and one Type III Barricade are installed in advance of it. Thus, for each PCMS entered into the “PCMS-ARROWS-RADAR” worksheet (*Figure 6.1*), the Estimator automatically adds six Plastic Drums and one Type III Barricade and inserts them into the “ESTIMATE SUMMARY” worksheet (*Figure 6.2*).

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**PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)**

<table>
<thead>
<tr>
<th>Stage/Phase or Operation</th>
<th>NEW PCMS</th>
<th>MOVE PCMS</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX North end of Project (for duration)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For Duration of Project</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL:** 2

*Figure 6.1 – “PCMS-ARROWS-RADAR” worksheet*
Additional devices are also added for Portable Traffic Signals, AFADs, and for Smart Work Zone Systems (SWZS).
6.4 – TEMPORARY PROTECTION & DIRECTION OF TRAFFIC (TP&DT), LUMP SUM ITEM

The TP&DT Lump Sum item – often misconstrued as being synonymous with the entire Traffic Control Plan (TCP) – is actually a single pay item comprised of several individual Traffic Control items that do not otherwise have their own pay item category, including monies that might be used by the contractor to pay for labor costs related to the installation, maintenance, cleaning and removal of various TCD as called for in the Specifications. It can be considered as a “miscellaneous” item.

On the following page is an excerpt from the Cost Estimator listing some of the items that would be accounted for under the Temporary Protection & Direction of Traffic lump sum item:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Unit</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubular &amp; Conical Markers (Use Worksheet Below)</td>
<td>Each</td>
<td>0</td>
<td>$27.50</td>
<td>$0.00</td>
</tr>
<tr>
<td>Tubular &amp; Conical Marker MOVES (Use Worksheet Below)</td>
<td>Each</td>
<td>0</td>
<td>$0.50</td>
<td>$0.00</td>
</tr>
<tr>
<td>Temp. Concrete Barrier To &amp; From Stockpile (Includes Std. &amp; Tall Barrier)</td>
<td>ft</td>
<td>0</td>
<td>$5.50</td>
<td>$0.00</td>
</tr>
<tr>
<td>Remove Temp. Barrier from Project (Includes Std. &amp; Tall Barrier)</td>
<td>ft</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Move Concrete (“Zipper”) Barrier Laterally</td>
<td>Each</td>
<td>0</td>
<td>$300.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Move “Zipper” Machine To/From Storage (Min)</td>
<td>Lump Sum</td>
<td>0</td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>Guard Rail, Anchor Type 1</td>
<td>Each</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Guard Rail, Anchor Type 1 Modify</td>
<td>Each</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Guard Rail, Transition 2-Sides</td>
<td>Each</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Pole Base Excavation Covers</td>
<td>Each</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Work Zone Delineation Fence (Orange, plastic)</td>
<td>ft</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Temporary Chain Link Fence</td>
<td>ft</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Falsework Illumination</td>
<td>ft</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Incidental Flagging Hours</td>
<td>Hour</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Blue Tubular Markers</td>
<td>Each</td>
<td>0</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

**Estimated TP&DT:**  
Construction Budget: \[\text{Budget} \times 1.0\% = \$0\]

**Calculated TP&DT (from items above. Use $5000 Min.):** \[\$0\]

**TP&DT =** \[\text{Larger of the two amounts. Consider using the average if difference is greater than 100%}.**

See Section 00225.90(a-2) for other items included in the TP&DT lump sum Pay Item.

In the Cost Estimator, the calculated TP&DT Lump Sum item will be compared to an historical percentage of the total Project Construction Cost. Have the Construction budget number available as it must be entered into the spreadsheet. The Percentage amount is compared to the calculated Lump Sum amount. The larger of the two amounts will be used and carried forward into the Total TCP Cost Estimate. However, if there is a significant difference between the two values (> 100%), consider using the average of the two amounts.
6.5 – TCP COST ESTIMATE

Costs for temporary traffic control pay items fluctuate each year. Costs are adjusted annually following the release of the updated average annual pay item price report generated by the ODOT Highway Division’s Estimating Unit. Designers working on ODOT construction projects should not make additional modifications to the pay item costs in the Cost Estimator – including regional adjustments. These and other cost adjustments are made during the final stages of project development before the project is released for advertisement.

The last worksheet in the TCP Cost Estimator is called the “ESTIMATE SUMMARY” and summarizes all of the quantities and costs generated for traffic control devices.

Once all preceding worksheets are complete, Designers should remember to complete the cells in yellow on the ESTIMATE SUMMARY, where applicable to your project.

Before completing the Cost Estimate, revisit the entire workbook looking for any errors, oversights or omissions. In addition, the following items are worth noting:

- **“CHANNELIZATION” Worksheet:** Check for an appropriate percentage of replacement for Plastic Drums and Surface-Mounted Tubular Markers, as appropriate.
- **“BARRIER-GUARDRAIL” Worksheet:** You may prefer to calculate quantities for Barrier and Barrier Moves by hand in lieu of using this worksheet.
- **“BARRIER Accessories” Worksheet:** Quantities for the three new “Repair Temporary Impact Attenuator” pay items should be discussed with Construction office staff.
- **“ESTIMATE SUMMARY” Worksheet:**
  
  - **Temporary Traffic Signal Installation and Portable Temporary Traffic Signal:** Based on the staging plan, designs for signal installations should come from a Traffic Signal Designer. Approval to add a signal, even a temporary one, must come from the State Traffic Engineer.
  
  - **Flaggers and Pilot Cars:** Quantities should be calculated very carefully. Flagger hours are likely to be dependent on the scope of work and construction schedule. Designers should communicate with Construction Management staff who, having reviewed the scope of work and the staging plans, should be able to recommend or confirm quantities for these pay items.
  
  - **Flagger Station Lighting:** Used to light each anticipated Flagger station. Seek guidance from Construction staff to refine quantities, as needed.
  
  - **Traffic Control Supervisor (TCS):** See Chapter 3 for additional warrants and assistance in determining TCS quantities. Consult with Construction staff and the 2018 Standard Specifications to provide additional guidance regarding TCS quantities.
  
  - **Tow Trucks:** A rare pay item, but useful on projects with limited widths and where continuous flow of traffic in a single lane is critical. MUST include Special Provision language. Consult with Construction offices for use.

When submitting a TCP estimate, the “ESTIMATE SUMMARY” worksheet is typically the only worksheet needed. If sending electronically, the whole Excel file may be sent. Keep a copy of the entire workbook in both electronic and hardcopy formats for your Project File.