

Chapter 19

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19 Specifications, Bid Items, & Cost Estimate

Two separate documents are needed to complete the specifications for a project:

- The Oregon Standard Specifications for Construction; and
- Project specific special provisions.

The Oregon Standard Specifications for Construction is also known as just the standard specifications and is a published book. Therefore, it remains static until the next publication which occurs approx. every 3 to 5 years. In contrast to the standard specifications, the special provisions add, modify, and/or delete portions of the standard specifications based on project specific needs. Special provision boiler plates are used to create the project specific special provisions.

The Oregon Standard Specifications for Construction and special provision boiler plates are available [online](#).

NOTE: Always download new copies of the special provision boiler plates for each project since modifications to the special provisions can occur at any time.

The following is a list of specifications directly related to traffic signals:

- 00227 - Temporary traffic signals and illumination
- 00921 – Major sign support drilled shafts (for mast arm poles with mast arms 60' to 75')
- 00950 – Removal of electrical systems
- 00960 – Common provisions for electrical systems
- 00962 – Metal illumination and traffic signal supports
- 00963 – Signal support drilled shafts (for mast arm pole with mast arms up to 55')
- 00990 – Traffic signals

The following is a list of specifications indirectly related to traffic signals:

- 00440 – Commercial grade concrete
- 00442 – Controller low strength materials
- 00902 – Crosswalk closure supports
- 00970 – Highway illumination
- 02530 – Structural steel

Note that there may be references to other sections of the specifications not listed above. These references, while important, typically play a minor role in the overall specifications related to traffic signals.

19.1 Preparing the Special Provisions

Below is an outline of the step-by-step process required in the preparation of the special provisions for the project:

1. Determine which specifications are applicable to the project.
2. Download the current special provisions boiler plates of each applicable specification from the specification website.
3. Edit each special provision according to the project needs using Word with “track changes” turned on. If “track changes” is not used, review and future modifications become difficult.
 - a. Instructions are provided in orange italic font within parentheses. For example:
(Use the following subsection .42 when removed materials are to be stockpiled. Contact Region electrician for Region number, phone number, and all information regarding equipment to be salvaged. List materials and stockpile locations.)
 - b. The instructions shall be removed from the Special provisions, and will appear similar to what is shown below:
~~*(Use the following subsection .42 when removed materials are to be stockpiled. Contact Region electrician for Region number, phone number, and all information regarding equipment to be salvaged. List materials and stockpile locations.)*~~
 - c. Edits are limited to the instructions provided. Anything other than what’s contained in the current special provision boiler plate **REQUIRES** approval from the technical resource and state specifications engineer as per the instructions in the boiler plate.

The example below, according to the instruction set, is used on projects with loop splices. See Figure 19-1.

Figure 19-1 | Example: Special Provision Boiler Plate (Unaltered)

(Use the following subsection .40(a) on projects with loop splices.)

00990.40(a) General - In the paragraph that begins "Install wire between pole or...", replace the second sentence with the following:

Do not use junction boxes for splicing, except for loop wire splicing of loop wires to loop feeder cables.

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For projects that will have loop splices, the instruction information in orange italics within parenthesis must be deleted. The special provision should look like Figure 19-2:

Figure 19-2 | Example: Special Provision Boiler Plate (Modified for Use on Project)

(Use the following subsection .40(a) on projects with loop splices.)

00990.40(a) General - In the paragraph that begins "Install wire between pole or...", replace the second sentence with the following:

Do not use junction boxes for splicing, except for loop wire splicing of loop wires to loop feeder cables.

For projects that do **NOT** have loop splices, the entire subsection must be deleted. The special provision should look like Figure 19-3:

Figure 19-3 | Example: Special Provision Boiler Plate (Deleted Text for Use on Project)

(Use the following subsection .40(a) on projects with loop splices.)

~~**00990.40(a) General**—In the paragraph that begins "Install wire between pole or...", replace the second sentence with the following:~~

~~Do not use junction boxes for splicing, except for loop wire splicing of loop wires to loop feeder cables.~~

The edits shown in Figure 19-2 and Figure 19-3 are simply following the instructions that are provided within the special provision boiler plate (information in orange italics within parenthesis) and therefore do not require additional review and approval from the technical resource and state specifications engineer.

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If for some reason the current special provision doesn't meet the project needs, modifications that fall outside of the instructions within the special provision boiler plates may be proposed. Again, this requires approval from the technical resource and the state specifications engineer. The request for modifications may look something like Figure 19-4, where text has been added (shown in blue underline):

Figure 19-4 | Example: Special Provision Boiler Plate (Proposed Modification for Use on Project)

~~*(Use the following subsection .40(a) on projects with loop splices.)*~~

00990.40(a) General - In the paragraph that begins "Install wire between pole or...", replace the second sentence with the following:

Do not use junction boxes for splicing, except for loop wire splicing of loop wires to loop feeder cables and interconnect cable to interconnect cable.

It is important to note that the single line strikethrough for removal and signal line underline for additions are generated by the track changes feature in Word, not by changes in formatting.

Always use track changes when modifying the special provision boiler plates.

19.2 Review & Approval of the Special Provisions

Special provisions that have been created by making modifications according to the instructions that are provided within the special provision boiler plate (information in orange italics within parenthesis) do not require review and approval from the technical resource and state specifications engineer. However, the traffic engineering section will do a courtesy review if requested.

Special provisions that have modifications that fall outside of the instructions that are provided within the special provision boiler plate (e.g., revisions shown in Figure 19-4) require review and concurrence of the [technical resource](#) and the state specifications engineer.

19.3 Bid Items

Bid items are defined in the specifications and are the means by which the contract work is paid. The specifications define the title of bid item, the unit of measurement, and what work is included in the bid item. The following sections are used (depending on the scope of the project):

- 00227.90 contains the list for all temporary signal bid items
- 00902.90 contains the bid items for crosswalk closure supports
- 00921.90 – contains the list for all permanent signal pole foundation for mast arm poles with mast arms 60 to 75 feet (foundations are the only item that is not inclusive in the 00990.90 bid items)
- 00950.90 contains the list for removal of electrical systems
- 00990.90 contains the list for all permanent signal bid items
- 00963.90 contains the list for all permanent signal pole foundations for mast arm poles with mast arms up to 55 feet (foundations are the only item that is not inclusive in the 00990.90 bid items)

These bid item lists are explained in more detail in the following subsections and can be found on the specification website. The vast majority of project work should fit within these existing, standard bid items. If the standard bid item lists do not meet the needs of the project, contact the state traffic signal engineer for guidance. The solution may involve use of an existing standard bid item or creation of a new bid item. Use of a new, unique bid item requires approval of the state traffic signal engineer and the state specifications engineer.

When detailing design items on signal plan sheets that have the potential to also be detailed in other disciplines' plan sheets (e.g., signs, illumination, ITS), always coordinate with the other discipline to ensure the design item is only detailed (e.g., all information needed to fabricate and install) in one plan sheet, and not on the others. Other sheets may refer to the design item (e.g., see sheet X for installation information) if deemed useful. See chapter 21 for more information on detailing vs. referencing on plan sheets.

New, unique bid items are discouraged and require the approval of the state traffic signal engineer and state specifications engineer.

19.3.1 Permanent Signal Bid Items (00990.90)

The standard bid items available in the 00990.90 section of the specifications applies to permanent signal installations:

- **TRAFFIC SIGNAL INSTALLATION – LUMP SUM**
Used for all new installations and for re-builds of existing signals. Includes the new permanent traffic signal, detector system, and removal of existing electrical features. Specifically includes what is shown on the signal plan sheet, detector plan sheet, and removal plan sheet. Excludes the interconnect system. Excludes mast arm pole foundations (See section 19.3.2 for foundation bid items).
- **TRAFFIC SIGNAL MODIFICATIONS – LUMP SUM**
Used for existing installations where the traffic signal is modified. This includes the detection system. Excludes the interconnect system. Excludes mast arm pole foundations (See section 19.3.2 for foundation bid items).
- **RAMP METER SIGNAL INSTALLATION – LUMP SUM**
Includes the new permanent ramp meter signal, detection system, and removal of existing features. Specifically includes what is shown on the ramp meter plan sheet and removal plan sheet. Excludes the interconnect system.
- **FLASHING BEACON INSTALLATION – LUMP SUM**
Includes the new permanent flashing beacon and removal of existing features. Specifically includes what is shown on the flashing beacon plan sheet and removal plan sheet. This bid item also includes integrated speed feedback signs. Unintegrated speed feedback signs will use specification 00991 (and the associated bid items in 00991). See chapter 12 for more information on speed feedback signs.
- **INTERCONNECT SYSTEM – LUMP SUM**
Includes the new or modifications to the existing interconnect system and removal of existing features. Specifically includes what is shown on the interconnect plan sheet and removal plan sheet.

All of the bid items above, except for the INTERCONNECT SYSTEM – LUMP SUM, are location specific. For example, if the project included three new traffic signals, three separate TRAFFIC SIGNAL INSTALLATION – LUMP SUM bid items would be used, one for each location. Each bid item contains a description of the location (typically labeled “mainline at side street”) as shown:

US20 at Main St.

TRAFFIC SIGNAL INSTALLATION – LUMP SUM \$125,000

US20 at 9th St.

TRAFFIC SIGNAL INSTALLATION – LUMP SUM \$95,000

US20 at High St.

TRAFFIC SIGNAL INSTALLATION – LUMP SUM \$140,000

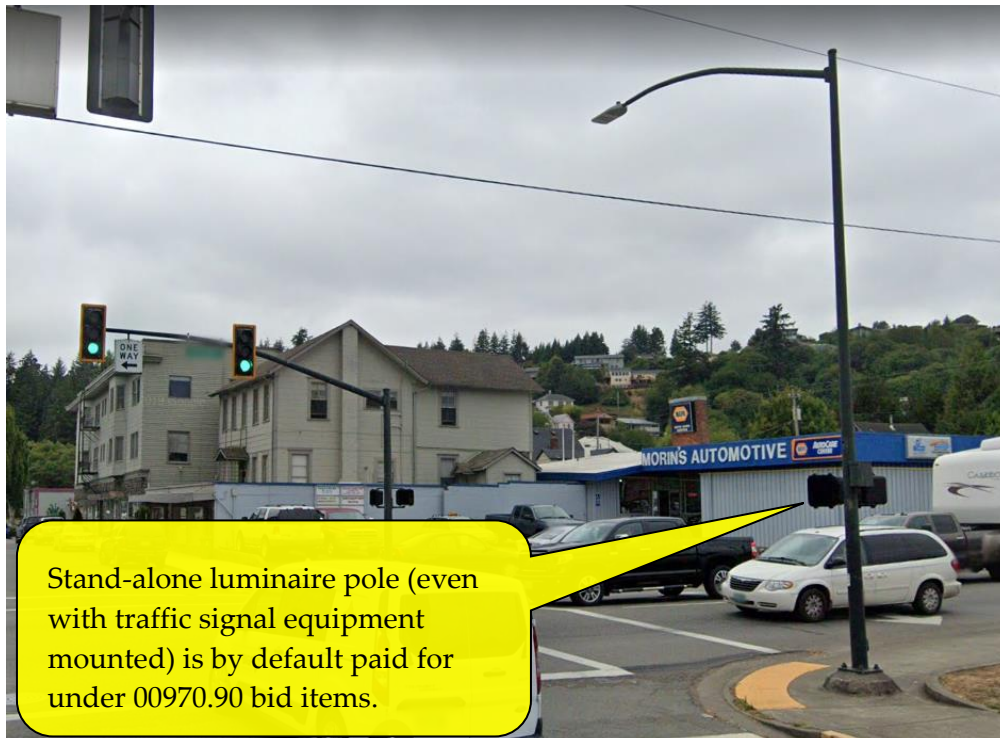
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It is also important to note that any items that are detailed on the signal plan sheets are paid for under the applicable traffic signal bid item. Any items that are referenced on the signal plan sheet are not paid for under the traffic signal bid items. A common example of this pertains to signs attached to signal equipment; if a sign is detailed on the signal plan sheet it is paid for under the traffic signal installation bid item which is lump sum. If the same sign is only referenced on the signal plan, but detailed on the signing plan sheet, it is paid for under the signing bid items (e.g., 00940, etc.). Note that crosswalk closure supports should now only be paid under 00902.90 (see section 0 for more info).

Verify that items detailed on the signal plan sheets are NOT detailed on other plan sheets (signing is a common item). See chapter 21 for more information on detailing vs. referencing on the plan sheets.

Stand-alone luminaire poles that are located at a signalized intersection (even in the rare case when they have traffic signal equipment mounted to them) are by default not included in the 00990.90 traffic signal lump sum bid item. The appropriate bid items listed 00970.90 should be used. See Figure 19-5 for example. However, depending on the scope of the project, modifying the default standard via the special provisions and including the stand-alone luminaire pole in the traffic signal lump sum bid item may be a good option (for example, if there is only one stand-alone luminaire pole on the project or there are no separate illumination plans).

Figure 19-5 | Example of Stand-Alone Luminaire Pole at Signalized Intersection (Not Included in the Traffic Signal Lump Sum Bid Item)



19.3.2 Permanent Signal Bid Items - Foundations (00921.90 & 00963.90)

Foundations for mast arm poles are excluded from the traffic signal lump sum bid items as per 00990.90. These foundations were intentionally separated from the lump sum bid item in approximately 2005 (when the new SM poles were designed) in order to track to the costs of the updated foundation design that resulted in a larger foundation and different installation method. There was concern that the new foundation installation would increase the cost of a traffic signal significantly, which over time has proven to not be the case. However, with the recent addition of mast arm poles that can accommodate 60 to 75 mast arms in 2020 (which have an even larger foundation) tracking the foundation costs of mast arm poles separately is still desired. At some point in the future, tracking these costs separately may no longer be desired and foundations may once again become part of the traffic signal lump sum bid items.

The standard bid items available in the 00963.90 section of the specifications applies to the foundations for permanent signal installations for mast arm poles with mast arms up to 55 feet.

- **36 INCH DIAMETER SIGNAL SUPPORT DRILLED SHAFT – FOOT**
Used for all standard foundations that require an “FD” minimum diameter of 36 inches as per standard drawing TM653 (see table in upper left corner of drawing).
- **42 INCH DIAMETER SIGNAL SUPPORT DRILLED SHAFT - FOOT**
Used for all standard foundations that require an “FD” minimum diameter of 42 inches as per standard drawing TM653 (see table in upper left corner of drawing).

The standard bid items available in the 00921.90 section of the specification applies to foundations for permanent signal installations for mast arm poles with mast arms 60 to 75 feet.

- **54 INCH DIAMETER SIGN SUPPORT DRILLED SHAFT FOUNDATION – FOOT** Used for all standard foundations for as per standard drawing TM655 (use design no. 6 on TM628)

If the project has a non-standard foundation, work with the structural designer to determine the correct “FD” minimum diameter and which bid item to use. Use of an “FD” minimum diameter that is not 36” or 42” is very rare and should be avoided if possible.

This is the only signal bid item where a quantity is measured for payment and is not location specific. For the entire project, add up the foundation depths for all 36 inch “FD” minimum diameter foundations. Do the same for all 42 inch “FD” minimum diameter foundations and for all 54 inch sign support drilled shaft foundations on the project.

19.3.3 Removal of Electrical Systems Bid Items (00950.90)

The standard bid items available in the 00950.90 section of the specifications applies to removal of traffic signal equipment:

- **INCIDENTAL TO INSTALLATION BID ITEM** - If the removal work meets the criteria for “method A”, which occurs when existing electrical systems are removed and replaced with new electrical systems, no separate bid item for removal is used. The removal work is inclusive to the new electrical system bid item (e.g., TRAFFIC SIGNAL INSTALLATION – LUMP SUM).
- **REMOVAL OF ELECTRICAL SYSTEMS – LUMP SUM**
By definition in the specifications, this bid item is used when the removal work meets the criteria for “method B”, which occurs when existing electrical systems are removed and are not replaced with new electrical systems. This bid item is location specific. See section 19.3.1 for more information on location specific bid items.

19.3.4 Temporary Signal Bid Items (00227.90)

The standard bid items available in the 00227.95 section of the specifications applies to temporary signal installations:

- **TEMPORARY TRAFFIC SIGNAL – LUMP SUM**
By definition in the specification, this bid item includes all required materials called for by the plans and specifications. This includes all temporary appurtenances shown on the temporary signal plan sheet, the temporary detector plan sheet, the temporary interconnect plan sheet, etc. This bid item is location specific. See section 19.3.1 for more information on location specific bid items.
- **PORTABLE TRAFFIC SIGNAL – EACH**
This bid item is normally used by the traffic control plans designer, not the signal designer. See chapter 11 for more information on portable traffic signals and their use in projects.
- **TEMPORARY FLASHING BEACONS – EACH**
By definition in the specification, this bid item includes all required materials called for by the plans and specifications. This includes all temporary appurtenances shown on the temporary flashing beacon plan sheet.

19.3.5 Crosswalk Closure Support Bid Item (00902.90)

The standard bid item available in the 00902.90 section of the specifications applies to crosswalk closure supports:

- **CROSSWALK CLOSURE SUPPORTS – EACH**
Crosswalk closures supports use to have two different methods for payment (as part of the lump sum traffic signal bid item and each) since the majority of these signs were installed at traffic signals. Since the ADA settlement agreement, the use of these signs at unsignalized intersections has greatly increased. To avoid payment confusion at unsignalized and signalized intersections on a project, the option to include these signs in the traffic signal lump sum bid item was removed. Coordinate with the sign designer to ensure the correct number of signs and who will be responsible for stamping this specification.

19.4 Letter of Public Interest Finding (LPIF)

Letters of public interest finding (LPIF) are required to document why it is in the public's interest to not follow a code of federal regulation (CFR) or Oregon statute requirement.

FHWA requires competition not only for the award of a construction contract, but also competition for the various materials and processes involved in the work. Whenever competition for materials or processes is eliminated, an LPIF is required.

General examples of materials or processes that require an LPIF are:

- Agency supplied materials
- Salvaged materials
- Work performed by agency forces

Typical traffic signal items that require an LPIF are:

- ITS equipment (processed by the ITS unit – Doug Spencer, typically agency furnished by price agreement contract)
- ATC controller (agency furnished, by price agreement contract)
- Salvaged equipment (common items are poles, controller cabinet, and radar/video detection). Note: salvaged equipment is intended to be re-used only by maintenance forces for emergency repairs or for replacement of equipment in-kind. It is not intended to be used on future projects with federal funding.

When salvaging equipment, a salvage cost estimate is required as per the LPIF process. The salvage cost for an item will be highest value of the two salvage cost estimate equations. See Figure 19-6. Salvage cost estimate examples for the most common items are shown in Figure 19-7.

Additional guidance and instructions for developing and processing LPIFs can be found in the [LPIF Guidance Document](#) on the [project control office website](#). LPIF examples and templates are also included on the website. You can also request LPIF examples for traffic signal specific items from the [state traffic signal engineer](#).

NOTE: The LPIF needs to be submitted and approved at least two weeks prior to PS&E submission. LPIF's should be submitted as early as possible. They are not always approved. The project schedule could be impacted if changes to the plans are needed due to the LPIF not being approved.

Figure 19-6 | Salvage Cost Estimate Equations

Salvage Cost Estimate Equations	
For each salvaged item, calculate and use the highest value of the 2 equations	
Depreciated Value Based on Service Life	Salvage Cost Estimate 1 = $\frac{\text{Service Life}^{(a)} - \text{Item Age}^{(b)}}{\text{Service Life}^{(a)}} \times \text{Cost of New Item}^{(c)} \times \text{Depreciation Factor}^{(d)}$
Scrap Value Based on Material Recycling	Salvage Cost Estimate 2 ^(e) = $\text{Quantity of item}^{(f)} \times \text{Scrap Cost Per Quantity}^{(g)}$
<p>a: Use the following values (Contact the state traffic engineer for service life information of other items):</p> <ul style="list-style-type: none"> * 50 yrs for a large pole or steel structure * 10 yrs for a controller cabinet * 5 yrs for radar * 3 yrs for video detection <p>If the item age is greater than or equal to the service life, equation 1 = \$0</p> <p>b: Use as-built plans or maintenance history to determine the item age</p> <p>c: Use recent project cost data or signal cost estimating tools to determine the cost of a new item</p> <p>d: Use the following depreciation factors:</p> <ul style="list-style-type: none"> * 0.03 for 1st generation standard (e.g. truss arm, custom cabinet, radar/video model no longer sold, etc.) * 0.05 for 2nd generation standard (e.g., curved mast arm, 336 cabinet, etc.) * 0.10 for 3rd generation standard (e.g., 4-bolt base pole, 332 cabinet, etc.) * 0.30 for current standard (e.g. 8-bolt base pole, 332S cabinet, etc.) <p>e: Equation 2 is typically applicable for large poles (steel scrap value). All other traffic signal items that are commonly salvaged are of a material type or quantity that is not economical to seek scrap value.</p> <p>f: Use industry standard for recycling material (e.g. pounds of steel)</p> <p>g: Use recent industry data</p>	

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Figure 19-7 | Salvage Cost Estimate Examples

Most Common Salvaged Item	Given Conditions	Salvage Cost Estimate Calculations Bold Value = Salvage Cost Used in LPIF (highest value of the 2 equations)
Large poles (mast arm, strain pole)	<ul style="list-style-type: none"> New SM5L pole cost = \$32,000 Pole age = 19 yrs Current standard, 8-bolt pole base = DF of 0.30 lbs of steel in SM5L = 4,900 Material recycling rate = \$0.08 per lb 	<p>Equation 1 = $((50-19)/50) \times 32,000 \times 0.30$ Equation 1 = \$5,952</p> <p>Equation 2 = $4,900 \times 0.08$ Equation 2 = \$392</p>
Controller Cabinet	<ul style="list-style-type: none"> New cabinet cost = \$21,800 Cabinet age = 7 yrs Current standard, 332S = DF of 0.30 	<p>Equation 1 = $(10-7)/10 \times 21,800 \times 0.30$ Equation 1 = \$1,962</p> <p>Equation 2 = N/A (material content and quantity is insignificant)</p>
Radar Detection	<ul style="list-style-type: none"> New detector cost = \$8,800 Detector age = 6 yrs Model no longer sold = DF of 0.03 	<p>Equation 1 = \$0 (item age is greater than service life)</p> <p>Equation 2 = N/A (material content and quantity is insignificant)</p>
Video Detection	<ul style="list-style-type: none"> New detector cost = \$6,000 Detector age = 1 yrs 3rd generation standard = DF of 0.10 	<p>Equation 1 = $(3-1)/3 \times 6,000 \times 0.10$ Equation 1 = \$400</p> <p>Equation 2 = N/A (material content and quantity is insignificant)</p>

When the salvage cost equations = \$0, the item should typically not be salvaged. However, there can still be good reasons to salvage a \$0 item that the equations do not take into account, such as needing the item for research purposes, or needing the item on-hand to allow a quick emergency fix response (some items have an unacceptably long procurement time for an emergency response). Contact the state traffic signal engineer when the salvage cost equations = \$0 to discuss reasons and options.

19.5 Cost Estimate

Once the appropriate bid items are chosen, a cost estimate must be completed for each bid item. The bid item estimates should be based on historical data, available industry data, manufacturer quotes, and project specific research.

For ODOT signal designers, an excel spreadsheet (typically updated yearly by the traffic engineering section) can be downloaded from the [signal specs share drive](#) to assist in cost estimating. The file name will appear as “Signals2022-1.xls”, with the date in the file name changing to reflect the current year and the number after the date changing to reflect the version if multiple changes are made during the same year.

ODOT internal estimating tools cannot be given to external staff.

19.5.1 Anticipated Items

Anticipated items are used to provide a funding mechanism for non-biddable elements of work that may be needed to complete a project. Anticipated items should not be used for items of work that can be competitively bid (e.g., unfinished or incomplete design work). Anticipated items are included with the cost estimate.

For signal work the following items require an anticipated item:

- Power hook-up (when installing a BMCL, BMC, or SC & MS). This should include conduit, trenching, and wiring from the power source to the traffic signal service cabinet. Coordinate with the region utility specialist to determine a reasonable cost estimate.
- Anything that is on price agreement, such as communication gear and ATC controllers.