PLANS PREPARATION GUIDE

PBOT

PORTLAND BUREAU OF TRANSPORTATION

VERTICAL INFRASTRUCTURE PERMITTING

JULY 2021

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I. Introduction

The Vertical Infrastructure Process relies on plans to review, build, and inspect the permitted jobs. This guide identifies methods and requirements necessary for clear easy to read construction drawings. A good set of drawings will identify and highlight the proposed work and will omit extraneous information.

While there is a need for some background information, this will largely be summarized on the cover sheets and vicinity maps. Plan sheets shall clearly show the proposed design while avoiding extra information/linework that does not apply to the proposed vertical Infrastructure improvement. On the plan sheets, proposed work will be highlighted while other information is faded back (i.e. a road plan will have highlighted roadway information and faded utility information and a lighting plan will highlight impacted lighting elements (such as new raceways and conductors) while unimpacted lighting elements are faded). Unnecessary information, such as detailed on-site plans or unnecessary linework should be omitted from the drawings.

The information contained in this guide provides information to help the design engineer identify what is necessary and required vs. what is unnecessary and distracting.

II. Permit *Construction Drawings*

The Permit Construction Drawings are the documents required for the review, construction, and inspection of a project.

All construction details are to be applicable to the project being developed. It is acceptable to use details from previous permits, however they should be examined closely and modified as required to ensure that they are applicable to the current project.

The designer is to take every opportunity to reduce the volume of the plans by using logical combinations of plan series to best display the information. Displaying too much information may cause confusion to the reviewer, public works inspector and the contractor bidding the project. On the other hand, a series of plan sheets with minimal information displayed on each sheet makes it difficult to determine the interrelationship of different items of work, which could also equate to increased prices by bidders estimating the project. A balance resulting in the complete and accurate information on the correct series of construction drawings is what is necessary.

A. Plan Sheets

The designer, early in the design process, needs to give careful consideration to the different series of plan sheets that will be required and the information that will need to be displayed on each series.

1. Drawings shall be produced on 22-inch x 34-inch plan sheets. Therefore, references will pertain to that size unless otherwise noted. In general, the plotting scale for 22-inch x 34-inch plan sheets is 1 inch equals 10 feet (1"=10'), except as indicated below.

2. Plan sheets that are not trimmed to the above dimensioned paper will not be accepted and returned to the engineer. Delays due to incorrect paper size are solely the responsibility of the permittee.
3. There may be occasions when the scale of a plan sheet needs to be decreased to as much as 1"=20' or smaller. When this is done, the designer needs to get approval from the Permit Reviewer and also to examine the sheet to be sure that required information is easily read. It may be necessary to resize some text or symbols and/or use exploded views of some areas to ensure the drawings are clear and readable.
4. Sheets requiring a larger scale to display a great deal of information in a small area should be drawn to an appropriate scale to allow all information to be easily read and understood.
5. Do not use gray shading or cross hachuring (hatching) as it makes the drawings more difficult to read.
6. All screened (half-toned) portions of plan sheets shall be dark enough to adequately reproduce.
7. Do not show contour lines on Plan & Profile sheet. Contours may be shown on Erosion Control Plan or Grading Plan sheets.
8. To distinguish proposed improvements from existing features, use heavier bold line weights for proposed and lighter line weights for existing.
9. The minimum lettering height for all text (notes, symbols) shall be 0.1 inch, and shall be all uppercase.
10. Symbols shown on the plan sheets shall be included, limited to those used in the specific plan set, and match the legend. Symbols should be proportional sized to the drawing. For example, a typical manhole symbol should not be scaled so that it looks like the diameter is 10 feet wide. The symbols in the legend shall match the size and line weight in the drawing.
11. Under most circumstances, lettering and dimensioning shall be placed so they may be read from either the bottom of the sheet or the right side of the sheet. Text shall not be placed across roadway centerlines or right of way lines. Text is to be clear of all lines, and should be placed outside the drawing itself. All keynotes and symbols referencing the same item (such as carrier equipment on a pole) are to be affixed to a shared leader line. Leader lines shall not cross one another or text. The only exception to the bottom and right reading text are as follows:
    i. All information identifying a centerline, such as line designation, stationing, tick marks, and bearings, shall be placed on top of the line and read left to right, with both the top of the line and left to right being based on the direction of the stationing.
12. Each plan view sheet shall have a north arrow and a scale bar. The north arrow will be oriented towards either the top or right side of the sheet. Never show the north arrow pointing down. Keep north arrow and scale in the same area of the sheet.
13. The drawings may show the slope of a line in several forms, such as ratio, percentage, and decimal. When a slope is shown in ratio form, it is shown as run over rise, which is opposite of mathematical standards in which a slope is always given as rise over run in ratio and fraction form. A 4:1 slope means that the slope has a 4-foot horizontal run and a 1-foot vertical rise.

B. Sheet Layout Format

Stamping: Plans and Specifications shall be stamped with a seal, signature, and the date signed; the expiration date of the license is optional.

The Licensed Engineer's seal, signature, date signed (expiration date of license is optional), and logo is to be placed on all plan sheets. Plans and specifications signed digitally shall follow the requirement set by OSBEELS. Digital signing systems such as Docu-sign or equivalent is acceptable. Seals should only be signed when PBOT gives notification that plans are complete.

Plan sheets containing only standard drawings do not require a title block and does not need the Licensed Engineer's seal and signature.

C. Title Block Information

All plan sheets have a title bar on the bottom of the plan. Fill in the information according to the following instructions:

1. DESIGNED BY: The first and last name of the person who designed the sheet.
2. CHECKED BY: The first and last name of the Engineer of Record
3. REVISION box: To be filled out when there is a revision made after the issuance of permit. In the block labeled REVISION, give a brief description of the revision that was made. Note, this is used only after the drawings are sealed and approved.
4. DATE: Enter the date in which the revision was made.
5. BY: Enter the initials of the person who made the revision.
6. PBOT JOB NUMBER
7. PROJECT/SHEET TITLE BOX: In the top portion of the box, enter the exact project name, as given by PBOT. In the lower portion of the box, enter the sheet name as it appears in the Title column of the Index
8. SHEET NUMBER: All sheets shall be labeled in numeric order. Erosion Control sheets may have a separate numbering series.
    i. For structural sheets, use the following sub-numbering system: ST – XX
    ii. For street lighting and signals, including temporary lighting, use the following sub-numbering system – IL-XX

III. Plan *Sequence* of Elements

A. Assembling Plan set

The following outline is the sequence to follow when assembling the construction drawings. It is a list of possible elements of work and is not intended to represent a project. Multiple elements may be combined on a single sheet, but the elements must be in the same sequence. Street Lighting, Structural, Signing & Striping, and Erosion Control elements must be on their own sheet and shall not be combined with other elements.

B. Sequence of Plan Elements

Plan elements not necessary do not need to be included.

1. Project Name
2. Site Map
3. Vicinity Map
4. General Notes
5. Sheet Index
6. Table of Contents
7. Project Contacts

8. Roadway sections
9. Stage construction (if applicable)
10. Plan & Profile
11. Curb Ramp & Driveway Details
12. Structural Plans & Details
13. Street Lighting Plans & Details (including Temporary Street Lighting)
14. Traffic Signal Plans
15. Signing and Striping
16. Standard Drawings
17. Erosion Control plan
18. Erosion Control details

C. Description of Plan Elements

1. ***Project Name***
   The project name, as assigned by city staff, shall appear at the top of the cover (or 1st) sheet of the construction drawings.

2. ***Sitemap***
   - Highlight the project area
   - Rights-of-way line
   - Property Address and Tax Lot Number
   - Street Names
   - Drawing Scale
   - North Arrow

3. ***Vicinity Map***
   - Scale should be no smaller than 1" = 600'
   - Oriented with north pointing up
   - Label the streets to be improved
   - Show at least one major north/south and a major east/west street
   - Shows the limits of permanent work, such as signing, striping, drainage, landscaping, and so on, to be performed
   - Show features such as waterways and streams

4. ***General Notes***
   The notes can be found on the PWP website or provided by city staff. Delete all notes that are not applicable and add additional notes as needed.

5. ***Sheet Index***
   Include on larger projects with multiple plan/profile sheets

6. ***Table of Contents***
   List all sheets by name and sheet number

7. ***Project Contacts***
   List the name, mailing address, phone number, and email address for the following:
   - Permittee (Owner)
   - Engineer of Record
   - Contractor (if available at time of permit issuance)

8. ***Typical Roadway Sections***
   Roadway sections are to provide complete geometric information on the roadway cross section from the subgrade up and general information left and right of centerline. The information on the roadway sections will tie directly to the plan and the profiles.

Roadway sections are required for every combination of surfacing and paving depths used.

Roadway sections are to represent conditions from the subgrade up for the entire length of the construction line(s). Start at the beginning station on an alignment and identify all stationing to the end of line without gaps/overlaps. The typical roadway sections shall be proportional scaled to indicate lane widths and depths of materials to be placed. A 12-foot lane should be drawn so that it appears slightly larger than a 10-foot shoulder. A 2-inch lift of hot mix asphalt concrete (HMAC) should be drawn so that it appears approximately one quarter the thickness of an 8 inch lift of gravel base course.

Roadway sections should be drawn to reflect how the work is expected to be performed in the field. If HMAC is to be placed in multiple lifts, draw the roadway section to reflect this fact by showing the number of lifts with the required depths of each lift. Show each lift with an edge line that would indicate where each lift would end left and right of centerline. **DO NOT** simply draw each lift of HMAC to extend out into the shoulder unless this is exactly how the HMAC is to be placed.

Variable dimensions (for example, Varies 2' to 10') may be used to represent differences in shoulder or lane widths, or transition areas, only if it is clearly shown on the Plan & Profile sheet, by stationing, and the actual widths desired.

a. Roadway Section Items

Each roadway section in the project shall show the following applicable items:

- Horizontal dimensions of the roadway
- Project-specific design details and required features such as curbs, sidewalks, or fill & cuts
- The depths of surfacing and paving
- Station-to-station limits for each line represented by the roadway section
- The position of the profile grade and the construction centerline
- The type, width, and thickness of the existing surface, if the characteristics of the existing surface will affect construction
- A general note indicating that all surfacing and paving depths are compacted depths
- A slope table should be used when embankment and excavation heights vary enough to require different slope rates. Show side-slopes for embankment sections and in-slopes and backslopes for excavation areas

9. *Stage Construction*

If the work will be constructed in stages (e.g. temporary lighting or pedestrian detours), include drawings to show each stage of the construction. Each drawing should clearly show what has been constructed as existing and what is to be constructed for that particular stage. The drawings should not include the future stage.

10. *Plan & Profile –*

The alignment, right of way (R/W), and profile information will appear on the same plan sheets. The profile shall be placed above the plan view and the stationing shall be aligned vertically.

a. Street Horizontal Alignment

The following information will normally appear:

- Construction centerlines for all roadways being constructed.
- All stationing, bearings, and curve data associated with each construction centerline.
- Right of way lines. Will always be solid lines on the Contract Plans.
- Construction permits with private citizens, and all easements, identified by type and use.
- Ties of all construction permits and all easements to either the right of way or construction centerline—show both station and offset distance.
- Found Section Corners and monuments, with station and offset ties to construction centerline.
- On all projects that include grading, the slope catch lines shall be shown.
- When there are 2 or more alignments, the stationing used should be different enough as to not confuse which street the stationing is pertaining to.
- Station ticks
- Tangent bearings.
- Point of intersection (PI), Point of curvature (P.C.), Point of tangency (P.T.), Point on tangent (POT), Point on curve (POC), Point of compound curve (PCC), Point of reverse curve (PRC) and Point on semitangent (POST) for all horizontal alignment where applicable.
- Angle points (A.P.) in horizontal alignments.
- Curve data box showing:
    - Station of the point of intersection (P.I.) of bearings for each curve.
    - Delta for each curve: deflection angle between intersecting bearings.
    - Radius of each curve.
    - Tangent length for each: distance from P.C. and P.T. to the P.I.
    - Length of curve for each curve: distance from P.C. to P.T. along the horizontal curve.
- Construction stationing shall:
    - increase from the beginning of the project to the end
    - run from south to north, and west to east
    - Run from left to right and bottom to top on the sheet

b. Street Profile

Roadway profiles are required only when there is a change in the vertical alignment of the roadway under construction. If only a section of the vertical alignment is changed, a profile is required only for that section.

The station-to-station limits shown on each Profile shall match exactly to the station-to station limits shown on the corresponding Alignment.

The following information is required on Profiles:

- Elevation based on City of Portland datum.
- Beginning station and elevation (BVC) and ending station and elevation (EVC) of each vertical curve will be shown.
- The station and elevation of the point of intersection of the gradients (VPI) will be shown.

- Gradients between vertical curves—shown as a percentage, carried out to a sufficient number of places so that the calculation from the elevation at one VPI on the given gradient will give the elevation at the next VPI.
- Length of each vertical curve.
- Elevation and station at each break—angle point; AP—in gradient with elevation shown to 0.01 foot.
- The existing ground line will be shown as a dashed line.

The designer needs to give some thought to the layout of the Profile prior to placing information, because the layout is to be the same on each Profile.

c. Construction Notes

- May be either bubbles with a list of notes or leader lines with notes.
- Used only to convey instructions to the contractor. They are not to identify existing features, existing or proposed rights-of-way lines.
- Shall be numbered consecutively within each plan element of the project. However, only the construction notes that are applicable to a particular sheet shall be shown on that plan sheet.
- For a long continuous street that span over 2 or more sheets, once you have created a construction note 1, it will always be the same for all sheets. Continue sequencing of construction notes consecutively as you add them. Do not restart the number sequence for each sheet.
- Place bubbles or notes outside of the work area.
- If multiple construction notes are pointing at the same element, add additional bubbles to the same leader line in lieu of multiple leader lines.
- Leader lines are not to cross each other, cross over text, or cross over bubbles.
- Construction notes may be used to supplement (but not in lieu of) standard symbols.

11. *Curb Ramp & Driveway Detail Sheet*

The curb ramp and driveway elevation details may be shown on the same plan sheet. The minimum scale for the curb ramp and driveway detail is 1 inch = 5 feet.

The following information is required on the curb ramp detail:

- Elevation points must be shown at the following
  - Top of curb and gutter line of the wings and ramp throat
  - All four corners of the landing pad
  - Match points to the sidewalk
- Distances between the above listed points

The following information is required on the driveway detail:

- Elevation points must be shown for the following
  - Top of curb and gutter line of the wings and driveway throat
  - Front and back points of the sidewalk, and the
  - Match points to the sidewalk
- Distances between the above listed points

The elevations and distances may be shown in table.

12. *Structural Plan & Details*

Structural improvements shall be shown on its own sheet. Provide an approval signature line for the PBOT Structural Engineering Supervisor in the titleblock.
These sheets shall be part of the ST-x numbering series and will have the PBOT Structural Engineer's signature information.

13. *Street Lighting Plan & Details*

A street lighting plan is required. For design elements that cannot be clearly conveyed and readable at scale, an exploded view is required. Show and identify all lighting equipment on and across from project frontage, typically within 100 feet. Show existing and proposed features that may impact the placement of street lighting components including driveways, hydrants, street trees, and vaults. Identify any overhead obstructions that may impact pole placement including canopies and aerial utilities.

Identify the lighting power source and service panel, including temporary power source (where required), even if not within plan sheet limits. Show service cabinet schematic and lighting branch circuit schematic on plan details. Include utility work request number and contact on the plan sheet.

Show temporary lighting (where required) on a separate street lighting plan sheet from proposed installation. Construction light plants and similar generator operated fixtures are not appropriate for use as temporary street lighting.

Use standard street lighting CAD library for symbols, legends, stamps, details, and construction notes from:
http://www.portlandonline.com/transportation/index.cfm?c=39639

Custom symbols and legends may be included to describe elements that are not defined in the standard library. Use supplemental keynotes only to provide additional explanation as required, affixed to the end of the leader line for the item to which they apply.

These sheets shall be part of the IL-x numbering series and will have the PBOT Signals & Street Lighting Division Manager's signature information.

14. *Signing and Striping*

The signing & striping plan may be combined but must be shown on its own sheet. The titleblock shall provide an approval signature line for the City Traffic Engineer.

Show existing signing, striping and pavement markings that will be removed, to remain, and proposed. Interim pavement markings for staged construction should be either shown on the stage construction drawings or on a separate plan sheet from the permanent.

Striping should identify the type of line, color, width. The line shall be labeled with the beginning and ending stations and offset to the centerline. Dimension all lane widths including bicycle lanes.

Paving or pavement marking details, such as the layout of a traffic island, may be required at a larger scale to provide sufficient information or required dimensioning to clearly show the construction.
The signing plan shall identify the signs to be removed and the proposed signs. For the proposed signs, show the sign type, size, and station and offset from the centerline.

15. *Standard Drawings*

Include all applicable standard drawings. Use the most current version of the City standard drawings first. If there is not a City standard and an ODOT standard drawing is available, then those may be used. Check with the Permit Reviewer prior to using non-City standard drawings.

One standard drawing per sheet. Do not use title block.

16. ***Erosion Control Sheets***

    a. **Erosion Control Detail Sheet:** The details may be included on the Erosion Control Sheet if there is sufficient space. The Erosion Control Details should meet the requirements of the *Plan & Profile Detail Sheet*.

17. ***Carrier Infrastructure Informational Sheets***
    Plan sheets associated with carrier equipment may be included in this plan set but shall not be placed on City of Portland title block. Mark these sheets as “For Information Only”.

IV. Plan Set Submittal Requirements

A. Iterative Design Review Submittals for Review

File naming format:

TVX### . NODE_## . document subject . REV# . date sent . file type

SAP / VI Project # (assigned by PBOT)	Node name (assigned by carrier)	Document subject (contents)	Review Cycle	Date sent (MMDDYYYY)	File Type (.pdf; .agi; .dwg; .doc)
TVX999	DOWNTOWN_55	SpecialProvisions	REV3	MMDDYYYY	.pdf

Verizon example

TVV001.Northrup_06.ExistStructuralAssesment.REV2.06232021.pdf

NCW/AT&T example

TVA001.MVILA_005.LightingAnalysisReport.REV4.06232021.pdf

The following items are required to begin a City pole attachment design review

(document subject):

* **Note:** No documents during the iterative design review phase shall have an integrated digital signature.

- City Attachment Intake Request (Request)
- PBOT Structural Design check sheet (StructuralCheckList)
- Existing Structural Assessment (ExstStructuralAssesment)
- Foundation Structural Calculations (StructuralCalcs)
- Foundation Structural Drawings (StructuralDrawings)
- PBOT Signals & Street Light Check Sheet and Design Check List (SSLCheckSheet and SSLDesignCheckList)
- Lighting Analysis Report and AGI32 Model (LightingAnalysisReport.pdf and LightingAnalysis.AGI)
- Special Provisions (SpecialProvisions.pdf and SpecialProvisions.doc)

- PBOT Civil Design Check list (CivilCheckList)
- Photosims of existing and proposed pole placement (Photosim)
- Boundary Survey (SurveyMap)
- Site Specific Detail Survey Map (DetailMap)
- Proposed Construction Drawings (Plans)
- Radio Frequency Safety Survey Report Prediction (RFSSRP)

Submission of the following items will be required upon completion of final review cycle:

- Draft of Public Notice (PublicNotice)
- 60 Day Shot Clock Cover Letter (60DAY)
- Propagation Map (PropagationMap)

Due to message size limitations (e-mails not to exceed 25Mb) City pole attachment requests may involve several e-mail submissions.

Please use the following e-mail subject line format:

Carrier Name - Node name - Location - Review cycle (*e.g. REV 0, REV1, REV2, etc*) - Date

Send to PBOT Vertical Infrastructure Permitting (pbotvi@portlandoregon.gov)

B. Final Plan Set Submittals for Signatures

1. Once the final iterative construction plan set has been approved, the applicant will submit only the construction plan set for City Signatures with the following criteria:
    a. Plan set to be < 25MB in size.
    b. Plan set to follow the standard naming convention using FINAL as the Review Cycle.
        i. Example: TVA001.MVILA_005.Plans.FINAL.06232021.pdf
    c. Ensure that the engineer of record (EOR) has stamped but **not** digitally signed this plan set.
    d. Submit to the PBOT VI email box as normal.
        i. Include the EOR in the cc line and provide EOR name/email address in the body of the email.
2. Upon receipt, the City will upload the plan set to DocuSign.
    a. EOR will receive an email from DocuSign to begin the signature process.
    b. City Reviewers will initial plans.
    c. City Division Managers & City Engineer will sign plans.
    d. After signing and initialing all appropriate boxes, DocuSign will notify all parties that the signature process is complete.
3. PBOT VI will distribute the Final Signed Plans to the Applicant.
    a. **Note**: This is not a permit.