PLANS PREPARATION GUIDE

PUBLIC WORKS PERMITTING

FOR THE FOLLOWING BUREAUS

- **TRANSPORTATION**
- **ENVIRONMENTAL SERVICES**

January 2011

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I. Introduction

The Public Works Process relies on plans to review, build, and inspect the permitted jobs. This guide identifies methods and requirements necessary for clear easily to read permit 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 in the vicinity maps. Plan sheets should clearly show the proposed design while avoiding extra information/linework that does not apply to the proposed public works 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 sanitary sewer plan will have highlighted sewer information with road design and utility information faded back). 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.

The drawings shall conform to the geometric design as documented in the Land Use or Inquiry Report and the Design Report. All construction details are to be specifically 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 specifically 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 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.

- 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.

- 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.
- 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 Review Manager 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 to make them legible.
- 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.
- –Do not use gray shading or cross hachuring (hatching) as it makes the drawings more difficult to read.
- All screened (half-toned) portions of plan sheets shall be dark enough to adequately reproduce.
- Do not show contour lines on Plan & Profile sheet. Contours may be shown on Erosion Control Plan or Grading Plan sheets.
- To distinguish proposed improvements from existing features, use heavier bold line weights for proposed and lighter line weights for existing.
- The minimum lettering height for all text (notes, symbols) shall be 0.1 inch, and shall be all uppercase.
- Symbols shown on the plan sheets shall be included 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. Symbols for existing and proposed shall adhere to item 6).
- 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 normally be placed outside the drawing itself. Leader lines shall not cross one another or text. The only exception to the bottom and right reading text are as follows:
- 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.
- 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.
- The drawings 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, wet 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. Plan sheets containing only standard drawings does not require a title block or 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:

- DESIGNED BY: The first and last name of the person who designed the sheet.
- CHECKED BY: The first and last name of the Engineer of Record
- 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.
- DATE: Enter the date in which the revision was made.
- BY: Enter the initials of the person who made the revision.
- PBOT JOB NUMBER
- BES JOB NUMBER:
- PROJECT/SHEET TITLE BOX: In the top portion of the box, enter the exact project name, as given by the Permit Project Manager. In the lower portion of the box, enter the sheet name as it appears in the Title column of the Index
- SHEET NUMBER: All sheets should be labeled in numeric order. Erosion Control sheets should have a separate numbering series.

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 cannot be combined with other elements.

B. Sequence of Plan Elements

1. Project Name
2. Site Map
3. Vicinity Map
4. General Notes
5. Sheet Index
6. Table of Contents
7. Project Contacts
8. Stormwater Narrative
9. Roadway sections
10. Stage construction (if applicable)
11. Plan & Profile
12. Curb Ramp & Driveway Details
13. Stormwater Details
14. Structural Plans & Details
15. Street Lighting Plans & Details
16. Traffic Signal Plans

17. Signing and Striping
18. Standard Drawings
19. Erosion Control plan
20. 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
- show the drainage basin limits
- 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 (labeled with names)

4. ***General Notes***
The notes can be found on the PWP website. 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. ***Stormwater Narrative***
Provide an explanation on how the stormwater is conveyed, treated, detained, and disposed. Also include the facilities square footage. Also include how private stormwater is disposed of.

9. ***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
- 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 sideslopes for embankment sections and inslopes and backslopes for excavation areas

10. *Stage Construction*

If the work will be constructed in stages, 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.

11. *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. Sewer Plan & Profile

- Existing sewer line information provided in both plan and profile (size, type, length & job number.).
- Standard mainline locations in reference to street centerline(s):
  - Sanitary mainline is located on the N & W side, 4' off centerline.
  - Storm mainline is located on the S & E side, of the street centerline. (See Stnd. Detail 3-60 & 3-61, and Sewer Design Manual 14-1).
- Plan View; identify pipe size, type & length (verify information matches the profile). Sewer Design Requirements Manual 4-3,4-4.
- Profile View; identify pipe size, type, length & slope w/ASTM & SDR referencing. Sewer Design Requirements Manual 4-3,4-4.
- Stationing agrees with pipe lengths in plan and profile, and the low end begins at 0+00 in the profile. Check profile grid for stationing clarity (street stationing is not acceptable for mainline construction, sewer stationing must be used). Provide stationing for check dams, stormwater facilities, manholes ,etc.
- Provide stationing and label/number for manholes in plan and profile views, and label "Tamperproof" if not in right-of-way and "Watertight" near waterways.
- Account for all rim elevations, sump and sedimentation MH bottom elevations and i.e.'s to MH's and mainline in profile view.
- Indicate angles of leads, laterals and mainline at manholes. Also, indicate the angle at all bends, and their location by station.

d. Storm Sewer Profile

The following information is to appear on the drainage profiles:

- Inlet and outlet flow line elevations of pipes—shown below the pipe profile. Inlet and Outlet flow line elevations are those elevations derived from pipe slopes carried to the center of drainage structure.
- Outflow treatments such as riprap, quarry spalls, and, if the ditch is other than a roadway or median ditch, ditch profiles.
- Debris deflectors, standpipes, and headwalls.
- The type of drainage structure and station and offset location of the structure—shown above the structure.
- The rim elevation of manholes, catch basins, inlets, or other storm sewer structures—shown above the structure.
- The horizontal distance between adjacent storm sewer structures from center of structure to center of structure.
- The size of pipe in each run.
- The pipe slope—carried out to sufficient decimal places so that when the calculation is made from the indicated inlet flow line, on the given

grade, for the given distance, the result will be the outlet flow line indicated.

- Finished ground line above the pipe.
- Original ground line if pipes will be placed prior to embankment construction or if original ground differs from the finished ground line.
- The established scale controls the drainage profiles vertically. There is usually no horizontal scale for the drainage profiles, but it is recommended that distances represented be drawn proportionately. Each profile will be drawn in proportion horizontally for the length of the profile (the space representing 10 feet will appear the same for the length of the profile and it will appear to be approximately two times a space, representing 5 feet).
- Use an elongated triangle to represent manholes and an elongated rectangle to represent other drainage structures (i.e. catch basins or inlets). The distance shown between sewer structures is not the length of pipe but the horizontal distance from center of structure to center of structure.
- Pipe diameters are to be drawn with proportionate scale, so a 12-inch-diameter pipe will be drawn half the size of a 24-inch-diameter pipe.
- The drainage profiles are to be drawn as a straight line representation of the path the water will take as it flows through the system, without regard for the actual plan view direction the pipes are running. The designer does not have to break the profile because a system that had been running parallel to the centerline has turned ninety degrees at an inlet or manhole and crossed the roadway.
- At locations where two or more pipes bring water to a drainage structure and one pipe carries the water away, there will have to be breaks in the profiles. One profile will continue through the common drainage structure and show the water leaving the structure, while the other profiles will stop or start at the common structure. There will be a leader line drawn between the representations of the common drainage structure with the note “same catch basin,” which is the tie between the profiles and completes each without having to draw the exit pipe a number of times. The information for the common structure will only be shown on one profile, usually the one that shows the outlet pipe.
- Profile is to always be above the plan view.
- Manholes in the profile are to be lined up with the corresponding manhole in the plan view.
- Show all utility mainline crossings in the profile view.
- Existing & proposed grade lines clearly marked in the profile.

e. 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.
- Leader lines are not to cross each other, cross over text, or cross over bubbles.

12. *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.

13. *Stormwater Details*

Details specific to the project being developed will have to be provided by the designer to ensure the contractor has a clear picture of the work to be performed.

It is important that details be complete, meaningful, and necessary. It is also important that details be drawn at a scale that will clearly show the information when reduced and placed on the 11-inch by 17-inch plan sheets.

Plan details are not to be a redrawn Standard Plan. Many times, however, it is necessary to draw details showing a project-specific modification to a Standard Plan. In these instances, sufficient detail is to be provided to indicate the modification, but all of the information on the Standard Plan that is still applicable is not to be redrawn. Instead, a note stating “FOR INFORMATION NOT SHOWN, SEE STANDARD PLAN X-XX” is to be included on the detail.

Details that are not associated with a Standard Plan must be complete, since the contractor is only obligated to provide what is shown on the detail.

14. *Structural Plan & Details*

If the improvement is minor, these elements may be combined on the street plan & profile sheet. If the structural improvements are major, then the these elements should be shown on its own sheet. The sheet shall provide an approval signature line for the PBOT structural engineer.

15. *Street Lighting Plan & Details*

May be shown on Plan & Profile if not type C lighting system.

The Plans Preparation Guide can be found at the following:
http://www.portlandonline.com/transportation/index.cfm?c=39639

16. *Traffic Signal Plan & Details*

The Plans Preparation Guide can be found at the following:
http://www.portlandonline.com/transportation/index.cfm?c=39639

17. *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.

18. *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.

A maximum of 4 standard drawings may be placed on one plan sheet. The drawings still must be legible and the letter height shall be 0.10” or greater.

19. *Erosion Control Sheets*

For a joint PBOT/BES permit or a BES only permit, the Erosion Control sheet should use the BES titleblock -
http://www.portlandonline.com/index.cfm?c=43845

For a PBOT only permit, use the PBOT titleblock -
http://www.portlandonline.com/index.cfm?c=43847

Erosion Control plan sheets should **not** be numbered in sequence with the rest of the plan set. The Erosion Control sheets are not part of the permanent record.

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*.