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Memo

To:	Doug Buskirk, Tom Barnitz		
From:	Brad Hyre	Project:	SCI-823-Ph3
CC:	File		
Date:	May 27, 2013	Job No:	189559

RE: SCI-823-0.00, PID 77366
Portsmouth Bypass Phase 3
Reference Plans/Profiles/Sections for Right-of-Way Submission

In order to prepare a reference plan set to submit with the right-of-way plans, many outstanding design issues resulting from Stage 1 comments and the VE study were investigated. These issues were investigated to varying degrees; some were redesigned, checked and incorporated into the reference plan set, while others were simply checked to ensure no additional right-of-way would be required if the change were made in final design. The intent was to establish fairly accurate and slightly conservative construction limits that would give the contractor some flexibility to make changes without taking an excessive amount of right-of-way. Items that were redesigned or investigated are detailed below. Please refer to the December 9, 2011 Memo - Stage 1 Geometrics Comments Discussion for additional information.

Any drainage changes from Stage 1 that are shown in the right-of-way reference plan set have been updated in the Stage 1 drainage calculation book unless otherwise noted. The current drainage calculation book is consistent with the reference plan set and is a combination of Stage 1 and revised Stage 1 calculations.

GENERAL BMP's

- Vegetated Filter Strips, Vegetated Biofilters (VBF), Extended Detention Basins and sheet flow will be used on the project whenever possible to satisfy BMP requirements. The BMP's have been investigated in order to determine possible locations for each of these measures and to determine if the BMP requirements would necessitate any locations of additional right-of-way. BMP treatment requirements can be satisfied for Phase 3 without the need for any additional right-of-way.
- Ditch widths required to satisfy VBF requirements are not reflected in the reference plan set for segments A and B. The cross sections were checked to verify the VBF could fit within the right-of-way, but were not revised. All ditches in Segment C, including the area of the VE profile change, reflect the width necessary to satisfy VBF requirements in the reference plan set.
- Possible Extended Detention Basin sites are SR 140 Station 12+00 LT or RT, the infield of SR 140 Ramp B, SR 823 Station 110+00 LT (not included in BMP calculations), 293+00 RT and 346+00 LT. An additional basin is possible at SR 823 Station 334+00 RT, but an excessive amount of right-of-way would be required to construct the basin so it was not included in BMP calculations. Two other potential basin locations are at the outlet end of the combined dual culverts discussed later in this memo. These two potential sites were not included in the BMP calculations, but they are within the proposed right-of-way. The detention basin sites are not shown in the reference plan set.
- The district requested for the SCI-823-6.81 project that all the ExT's be removed. The ExT's were not removed from the Phase 3 reference plan set because they do not affect right-of-way. ExT's in the location of the VE profile change were not redesigned and are shown without a length callout. If the ExT's are to stay as part of final design, any ExT's on or near an MSE wall need to be removed because they can not be constructed within the fill of an MSE wall. The ExT's are not necessary to satisfy BMP requirements for Phase 3.

GENERAL DRAINAGE

- All revisions to ditches meet capacity; however the drainage book was not updated with revised ditch lining calculations.
- Revised inlet spacing and storm sewers were designed and checked to ensure they would work; however the drainage book was not updated with the revised calculations unless the change is reflected in the reference plan set.
- All Stage 1 culvert comments were investigated and incorporated into the reference plan set as noted below. In addition, the drainage book was updated with all revised hydraulics for these culverts. Culverts are accessible at the inlet and outlet with adequate room to maneuver and provide maintenance within the proposed right-of-way.

SEGMENT A (US 52 to Station 79+00)

SR 140 Ramps A & B

- Horizontal geometry was adjusted to meet criteria for a converging roadway as shown in Figure 505-1a in L&D Vol. 1 for Ramp A and was adjusted to meet criteria for a diverging roadway as shown in Figure 505-2a in L&D Vol. 1 for Ramp B.
- Superelevation was adjusted to meet criteria for high speed urban highways shown in Figure 202-8 in L&D Vol. 1.
- Vertical geometry was maintained as only slight updates would be required to reflect the revised horizontal geometry and cross slope.
- These changes were performed in a working drawing and are not reflected in the reference plan set; however, right-of-way was adjusted in the reference plan set to accommodate these future changes.

Shorten deceleration lane for US 52 Ramp A Exit Ramp

- No changes were made at this time because shortening the deceleration lane would not require additional right-of-way.

Superelevation rate changes

- Modifications to superelevation rate in order to meet criteria for high speed urban highway for SR 823 Curve 1, US 52 Ramp A Curves 1 & 2 and US 52 Ramp B Curves 1 & 2 would have negligible impacts to the cross sections and construction limits. As a result, no changes were made at this time.

Drainage

- A paved gutter was added to the base of the retaining wall along US 52 Ramp B from Station 33+00 to 35+50 RT in order to eliminate the need for a channel easement on railroad property.
- The construction limits were adjusted along CR 503 Station 21+00 to 23+50 RT because the proposed ditch in the cross sections can not be constructed as shown in Stage 1. The cross sections were not updated in the reference plan set, but right-of-way is adequate to allow for construction of the ditch.
- The culverts and storm sewers in segment A were reviewed. It was determined that incorporating the stage 1 comments would have no impact to the proposed right-of-way. None of the stage 1 comments for culverts or storm sewers were incorporated in the plan set or drainage calculation book.

SEGMENT B (Station 79+00 to Station 180+00)

Superelevation rate changes

- Modifications to superelevation rate in order to meet criteria for high speed urban highway for SR 823 Curve 2 would have negligible impacts to the cross sections and construction limits. As a result, no changes were made at this time.

Pershing South

- Horizontal geometry was adjusted in the reference plan set to avoid impacts to a previously relocated property owner, and the vertical geometry was adjusted accordingly.
- A minimum radius of 200' was used. Per AASHTO A Policy on Geometric Design of Highways and Streets 2011 Edition Table 3-13b, no superelevation is required for a low-speed urban street with a minimum radius of 198' (25 mph design speed).
- A total roadway width of 21' was used per AASHTO Design of Very Low-Volume Local Roads, Exhibit 1 for 25 mph with a functional subclass of Industrial/commercial.
- AASHTO Design of Very Low-Volume Local Roads recommends a clear zone based on engineering judgment between 0' and 6'. Pershing was designed with a 2' graded shoulder and 4:1 foreslopes. In areas where the foreslope is steeper than 4:1 such as culvert locations, the graded shoulder was increased to 6'. No roadside barriers are proposed along Pershing South.
- Intersection sight distance was checked at the new intersection of Pershing South and Slocum. The design provides adequate Intersection Sight Distance according to Table 201-5 in the L&D Vol. 1 for 25mph (280' for left turns).
- The proposed drainage including storm sewers, ditches and culverts has been revised in the reference plan set. The drainage calculation book has not been updated to reflect the revised ditches; however, the revised storm sewer and culvert have been updated.
- Plan, profile, typical and cross sections were updated in the reference plan set to reflect the realignment, revised pavement width and revised drainage.

Pershing North

- The total roadway width of Pershing North was adjusted to 21' in the reference plan set to match that of Pershing South.
- Horizontal and vertical geometry were not adjusted for Pershing North.
- Roadside ditches were added to both sides in order to achieve proper drainage for the new roadway typical. The right ditch flows to a catch basin at Station 32+50 and then a storm sewer crosses Pershing North and outlets into the SR 823 ditch. A paved ditch was also added at the back of the retaining wall along the left side. These changes are reflected in the reference plan set. The drainage calculation book has not been updated to reflect the revised ditches; however, the revised storm sewer has been updated.
- Plan, typical and cross sections were updated in the reference plan set to reflect the revised pavement width and revised drainage.

Stout Hollow Road Cutoff Study

- Cul-d-sac options were investigated for Stout Hollow Road west of the SR 823 alignment. One option placed a T-turnaround just outside the construction limits of SR 823. This option would require additional right-of-way.
- A second option was investigated that would utilize the existing T-intersection of Stout Hollow Road (CR 246) and Dutch Ridge Road (CR 243). This option would not require any additional right-of-way and is recommended by HDR as the preferred option. No additional right-of-way is proposed to accommodate a T-turnaround, and no turn around is shown in the reference plan set.
- The fire chief was contacted regarding access to properties east of the SR 823 alignment. There is an existing CSX underpass near SR 335 that could potentially limit access by emergency vehicles. The fire chief confirmed that the current design will not create any issues, and that required equipment can access the remaining properties from SR 335.

AEP Transmission

- Exhibits were prepared to submit to AEP transmission regarding the crossing at Stout Hollow Road and the crossing near Station 208+00
- Tower at 160+00 LT can remain and the proposed right-of-way was placed between the construction limits and the tower.
- Tower at 171+00 RT will need to be relocated. The proposed right-of-way was kept close to the proposed construction limits to minimize the extent to which the tower needs to be relocated. AEP will need to relocate the tower outside of the proposed right-of-way.
- Exhibits of the vertical clearances were sent to AEP for review and concurrence. There may need to be restrictions during construction for the crossing near Station 208+00.

Bridges over CSX and Slocum

- Geotechnical reports prepared by DLZ were reviewed for the bridges over CSX and Slocum. The geotechnical reports indicate the use of 2:1 spill through slopes that transition back to 2.5:1 fill slopes at the abutments. The embankments are stable (calculated factor of safety is greater than the required target factor of safety of 1.5) according to the report under long term drained conditions.
- Various span arrangements were investigated to determine what would be required to get proposed construction limits off CSX property. The Stage 1 design has the rear abutment on top of an abandoned CSX line. Calculations were performed to determine increased beam and bridge cost to provide a 205'-220'-220'-140' span arrangement. Stage 1 span arrangement is 140'-195'-140'.
- Geopak Site models were created for these two bridges in order to ensure that the Stage 1 and revised bridge layouts work while providing positive drainage.
- ODOT directed HDR and Stantec to proceed based on the Stage 1 bridge design until they can coordinate with CSX.

Bridge Construction

- Right-of-way required to access and construct the CSX and Little Scioto River bridges was investigated. Temporary easements have been provided to accommodate crane movements. A separate memo was prepared discussing the methodology behind setting the right-of-way around these bridges. Please refer to the Memo – R/W needed for crane movements and access to site during construction – SR 823 over CSX and SR 823 over Little Scioto River for additional information.

Drainage (Reflected in reference plan set)

- SR 823 Station 107+00 to 111+50 LT: Embankment slope revised to 2.5:1 with a 10' bench at the toe of slope and a 10' ditch width.
- SR 823 Station 111+50 to 114+00 LT: Embankment slope revised to 2:1 and a ditch, catch basin and storm sewer were added to create positive drainage between the bridge spill through slope and the CSX right-of-way back to the culvert invert at Station 110+00.
- SR 823 Station 110+00 to 114+00 RT: A ditch was added to create positive drainage between the bridge spill through slope and the CSX right-of-way back to the culvert outlet at Station 110+00.
- SR 823 Station 116+00 to 118+00 LT: A proposed ditch at the toe of the bridge spill through slope has been added. The bridge spill through slope is 2:1 and transitions back to an embankment slope of 2.5:1 at the abutment. The toe of slope ditch drains north to a catch basin at Pershing South Station 15+00 RT.
- SR 823 Station 118+00 to 121+00: SR 823 surface inlet locations have been revised in the reference plan set to provide an improved outlet location for the storm sewers. The drainage calculation book has not been updated to reflect the revised inlet spacing; however, the revised storm sewers have been updated.
- SR 823 Station 124+50 to 129+00 RT: Embankment slope revised to 2.5:1 and toe of slope ditch depth reduced to eliminate right-of-way impacts to the adjacent property. In addition, the 10' bench is located within the fill slope.
- SR 823 Station 175+50 to 177+50 LT: The embankment slope was revised to 2.5:1 with a ditch constructed one foot below existing ground. The ditch was revised to reflect a 2:1 backslope construction limit perpendicular to the ditch not SR 823.
- SR 823 Station 176+50 to 182+00 RT: The ditch has been modified to allow for a concrete ditch to be constructed in order to eliminate potential erosion issues. The cross sections have been updated to ensure adequate right-of-way, but the paved ditch is not shown in the reference plan set.

Drainage (Not reflected in reference plan set)

- SR 823 Station 125+00 to 126+00 LT: The ditch needs to flow from 125+00 towards 126+00 or sheet flow off the project. The Stage 1 plans show a high point at Station 125+50 draining back toward Slocum Road. This does not impact the extent of right-of-way and it was not addressed at this time.

- SR 823 Station 128+50 to 130+25 LT: Inlet spacing calculations are not correct according to Stage 1 comments. The low point is at approximate Station 130+00 with no flanking catch basins. The calculations have been revised and the drainage book has been updated. Based on the revised calculations, the inlet spacing is deficient and should be revised for final design. The reference plan set shows the Stage 1 design since the final inlet spacing in this location will not impact the extent of right-of way.
- The culvert at SR 823 Station 175+55 could be rotated to align better with the natural channel. If this change is made, the outlet for this culvert and the culvert running parallel to SR 823 from Station 176+30 to 181+90 could have separate outlet headwalls. In addition, the inlet of the culvert running parallel to SR 823 could be moved upstation to avoid a rock cut at the inlet. All of these changes can occur during final design without having any impacts to the proposed right-of-way.

Culvert SR 823 Station 110+00

- Stage 1 comments were addressed
- Hydrology revised to use Rational Method
- The culvert length was slightly reduced due to the change in embankment slope and drainage patterns discussed above.
- Culvert size shown in Stage 1 submission has not changed

Culvert SR 823 Station 129+00

- Stage 1 comments were addressed
- Hydrology revised to use Rational Method
- Stage 1 comment regarding pipe size: Required pipe size from calculations is 36", per PAVR culverts in fill over 30' the culvert should be upsized 2 sizes to allow for future lining. Culvert 36"+12"=48". Culvert size not revised in reference plan set. ROW not impacted by culvert size.

Culvert SR 823 Station 167+25

- Stage 1 comments were addressed
- The culvert was moved and rotated to better align with the natural stream
- Revised embankment slopes and ditches in combination with the realignment of the culvert resulted in a significant increase in overall culvert length.
- Culvert size shown in Stage 1 submission has not changed
- RCP was added to the reference plan set

Culvert SR 823 Station 175+55

- Stage 1 comments were addressed
- Hydrology revised to use Rational Method
- Stage 1 comment regarding pipe size: Required pipe size from calculations is 36", per PAVR culverts in fill over 30' the culvert should be upsized 2 sizes to allow for future lining. Culvert 36"+12"=48". Culvert size not revised in reference plan set. ROW not impacted by culvert size.
- RCP was added to the reference plan set

Culvert SR 823 Station 176+30 to 181+90

- Stage 1 comments to use Rational Method for hydrology not addressed. Stage 1 Regression equation results used in calculations. The drainage area is 139 acres with two distinct and well defined channels.
- Stage 1 comment regarding pipe size: Required pipe size from calculations is 66", per PAVR culverts in fill over 30' the culvert should be upsized 2 sizes to allow for future lining. Culvert 66"+12"=78"
- Culvert size shown in Stage 1 submission has not changed
- RCP was added to the reference plan set

SEGMENT C (Station 180+00 to Station 353+00)

VE Profile Change

The SR823 profile was changed and incorporated throughout the plan set from Station 219+00 to 338+00 to reflect the Alternative VE-2B profile from the VE Study submitted in December 2009. As a result, cross sections, drainage and construction limits were all modified to reflect this change in profile.

Based on the review of DLZ's geotechnical reports and analyses, embankment slopes of 2:1 or flatter can be utilized within Segment C. DLZ's analyses indicate that the 2:1 embankment slopes meet or exceed the minimum target factor of safety of 1.30 for all embankment fills located north of Station 188+00. The revised profile and cross sections are utilizing flatter slopes (3:1 in most cases) and a lower vertical profile. Slope stability (based on DLZ's analyses and design recommendations) should not be an issue.

The cut slope recommendations presented in the cross sections within the limits of the revised vertical profile are for determination of the needed right-of-way only. As this project moves forward, the cut slopes for Phase 3 should be reviewed for conformity with ODOT's current design recommendations as presented in the Rock Slope Design Guide (April 2011) and Geotechnical Bulletin 3 "Rock Cut Slope & Catchment Design (April 15, 2011). This review may require modifications to the cut slopes in order to comply with ODOT's current specifications, but the modifications (if any) should not affect the project right-of-way.

Dual Culverts

There are two locations in the Stage 1 profile with dual 8'x8' box culverts in deep fill which share an outlet headwall (Outlet headwall at Station 238+80 and 303+10). The VE Study for Phase 3 investigated an alternative for each system by realigning the channels to intersect at the inlet requiring only one culvert at each location. The two locations are similar in nature, two drainage channels separated by a ridge between them. A channel must be cut through the ridges in order to connect the streams and bring them to a single culvert inlet.

There are no test borings located in the vicinity of the dual culverts to allow for the design of the necessary cut slopes should the stream channels be relocated. ODOT's Office of Geotechnical Engineering is aware of this issue as they authorized additional test borings in the area prior to the project being placed on hold. As such, the preliminary cut slope recommendations are based upon review of the encountered conditions at test borings located several hundred to several thousand feet from the culvert locations as well as the cut slopes presented in the Stage 1 plans. The cut slopes developed for the stream relocations are a best estimate based on the limited subsurface information available and should not be used for design moving forward. These geotechnical recommendations were modeled in order to set the right-of-way to give the contractor the option to build a single culvert in these locations. The cross sections, culverts and construction limits shown in the reference plan set however reflect two culverts at each location.

End Project/End Work Updates

Because of the design changes in Phase 1, the end project and end work flags were revised. The end project flag was moved from Station 352+00 to Station 353+00 to match the Phase 1, Part 1 plans. The end work flag was moved from Station 352+00 to Station 395+00 to match the Phase 1, Part 5 plans. Phase 3 will need to include paving SR 823 and the two southern most TR 234 ramps. This was not shown in the reference plan set; however the flags were updated and reference was made to the Phase 1 plans.

Ditches

- Toe of embankment ditches that have a backslope chasing the hillside to tie back to existing were modified to reduce the limits of construction and right-of-way. The 10' bench was moved into the embankment which in turn raised the ditch elevation and reduced the amount of cut required to construct the ditch. Ditch locations in the plan view and cross sections have been revised.
- SR 823 Station 182+00 to 183+50 RT: The ditch offset and width have been updated since Stage 1. The ditch between the two culverts is now 15' wide.

Inlet Spacing and Storm Sewers

- The inlet spacing calculations were revised and updated in the drainage book for the area of the VE profile change (Station 219+00 to 338+00). Inlets were moved to determine if new storm sewer outlet locations would impact right-of-way. The revised inlet spacing resulted in several storm sewers being removed or relocated.
- Inlet and storm sewers were removed from Station 229+00, 235+00, 243+00, 263+00, 284+50 and 340+00
- Inlet and storm sewers were added to the new low point at Station 237+00, 237+50 and 238+00
- Inlet and storm sewers were added to Station 231+00, 246+50, 256+50, 285+00 and 336+00
- Storm sewer outlet locations were revised at Station 323+00 and 346+00
- Inlet and storm sewers were moved from Station 333+00 to 333+50 in order to maintain existing drainage patterns. Inlet at Station 336+00 was connected to 333+50 to maintain existing drainage pattern.
- The sewer system from Sta 351+50 to 349+00 was modified to outlet at Sta 349+00. The revised outlet facilitates a larger area to be treated in the BMP basin located Sta 346+00 LT.
  The reference plan set and drainage calculation book has been updated with the storm sewers analysis impacted by the revised inlet locations listed above.

Culvert SR 823 Station 184+29

- Stage 1 comments to use Rational Method for hydrology not addressed. Stage 1 Regression equation results used in calculations. The drainage area is 99 acres with a distinct and well defined channel.
- Stage 1 comment regarding pipe size: Required pipe size from calculations is 66", per PAVR culverts in fill over 30' the culvert should be upsized 2 sizes to allow for future lining. Culvert 66"+12"=78"
- Culvert size shown in Stage 1 submission has not changed

Culvert SR 823 Station 209+30

- Stage 1 comments to use Rational Method for hydrology not addressed. Stage 1 Regression equation results used in calculations. The drainage area is 74 acres with a distinct and well defined channel.
- Stage 1 comment regarding pipe size: Required pipe size from calculations is 54", per PAVR culverts in fill over 30' the culvert should be upsized 2 sizes to allow for future lining. Culvert 54"+12"=66"
- Culvert size decreased from 72" to 66" in reference plan set and drainage calculation book

Culvert SR 823 Station 233+88 (VE Profile Change)

- Stage 1 comments were addressed
- Revised hydrology to Rational Method
- High Fill Culvert Use 8x8 box
- High outlet velocity. HY-8 used to calculate velocity reduction requirement. External Velocity Reduction Contra Costa, Length is 23 feet
- Culvert length reduced - plan, profile and cross section have been revised

Culvert SR 823 Station 239+18 (VE Profile Change)

- Culvert approved Stage 1
- Used Stage 1 Hydrology
- High Fill Culvert Use 8x8 box
- High outlet velocity culvert. HY-8 used to calculate velocity reduction requirement. Riprap basin protection required length is 35 feet
- Revised inlet/outlet locations to better fit the VE profile
- Culvert length reduced - plan, profile and cross section have been revised

Culvert SR 823 Station 297+34 (VE Profile Change)

- Culvert approved Stage 1
- Used Stage 1 Hydrology
- High Fill Culvert use 8x8 box

- High outlet velocity culvert. HY-8 used to calculate velocity reduction requirement. Riprap basin protection required length is 110 feet
- Revised inlet/outlet locations to better fit the VE profile
- Culvert length reduced - plan, profile and cross section have been revised

Culvert SR 823 Station 300+32 (VE Profile Change)

- Culvert approved Stage 1
- Used Stage 1 Hydrology
- High Fill Culvert use 8x8 box
- High outlet velocity culvert. HY-8 used to calculate velocity reduction requirement. Riprap basin protection required length is 33 feet. Extended RCP to limit of stream excavation
- Revised inlet/outlet locations to better fit the VE profile
- Culvert length reduced - plan, profile and cross section have been revised

Culvert SR 823 Station 311+81 (VE Profile Change)

- Culvert approved Stage 1
- Used Stage 1 Hydrology
- High Fill Culvert use 8x8 box
- High outlet velocity culvert. HY-8 used to calculate velocity reduction requirement. A Contra Cost Basin Length is 26 feet. Extended RCP to limit of stream excavation
- Culvert length reduced - plan, profile and cross section have been revised

Culvert SR 823 Station 320+43 (VE Profile Change)

- Stage 1 comments were addressed
- Hydrology revised to use Rational Method
- Stage 1 comment regarding pipe size: Required pipe size from calculations is 36", per PAVR culverts in fill over 30' the culvert should be upsized 2 sizes to allow for future lining. Culvert 36"+12"=48"
- Culvert size decreased from 72" to 48" in reference plan set and drainage calculation book
- Culvert length reduced - plan, profile and cross section have been revised

Culvert SR 823 Station 328+79 (VE Profile Change)

- Hydrology revised to use Rational Method
- Stage 1 comment regarding pipe size: Required pipe size from calculations is 36", per PAVR culverts in fill over 30' the culvert should be upsized 2 sizes to allow for future lining. Culvert 36"+12"=48"
- Culvert size decreased from 60" to 48" in reference plan set and drainage calculation book
- Culvert length reduced - plan, profile and cross section have been revised

Culvert SR 823 Station 344+82

- Culvert approved Stage 1
- High Fill Culvert use 8x8 box
- High outlet velocity culvert. HY-8 used to calculate velocity reduction requirement Riprap basin protection required length is 33 feet