PDN Stage 2 – Roadway Design QC Checklist

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| **SPOT ID/Project TIP #:** | Click or tap to edit. |
| **County:** | Click or tap to edit. |

2RD1 Alignment Defined

| **Item #** | **Review Item** | **Yes** | **No** | **N/A** |
| --- | --- | --- | --- | --- |
|  | **Recommendation Plan Set** |  |  |  |
|  | General |  |  |  |
|  | TIP number is shown on all sheets. |  |  |  |
|  | Plan sheet numbers are named correctly and shown on  each plan sheet. |  |  |  |
|  | The logo(s) for the roadway design and hydraulic firms producing the plans is shown on all sheets requiring seals. |  |  |  |
|  | “Document not considered final unless all signatures  completed” note is shown on all sheets requiring seals  and cells placed in Microstation files with design  proposed design elements. |  |  |  |
|  | "Do not use for right of way acquisition” note is shown on the title sheet and plan sheets. |  |  |  |
|  | Verify property access has been evaluated to determine if a service road study is needed. |  |  |  |
|  | A Design Exception Checklist has been completed for the mainline. |  |  |  |
|  | Title Sheet |  |  |  |
|  | Location of project shown and matches the TIP. |  |  |  |
|  | County is shown. |  |  |  |
|  | Type of work is shown and accurate. |  |  |  |
|  | Graphic scales are shown for plan and profile sheets |  |  |  |
|  | Design data is shown (i.e. traffic (let year and let year +  20 years, truck percentages, tier, classification). |  |  |  |
|  | A label is shown to identify the submittal (i.e. Recommendation Plan Set). |  |  |  |
|  | NCDOT Project Manager’s name is shown. |  |  |  |
|  | North arrow with correct survey datum is shown. |  |  |  |
|  | Begin and end stations for the TIP project is shown. |  |  |  |
|  | Begin and end stations of construction outside the TIP project limits is shown. |  |  |  |
|  | Mileage for the roadway, bridges, and total project  lengths are shown to three decimal places and is based  on the mainline stations. |  |  |  |
|  | Station equalities with adjacent TIP projects (including coordinate equalities) are shown and verified. |  |  |  |
|  | Layout of numbered plan sheets are shown. |  |  |  |
|  | Proposed alignment names are shown. |  |  |  |
|  | Existing road names, interstate, US, NC and state route numbers are labeled. |  |  |  |
|  | Proposed bridges and culverts 20’ and over are shown with begin and end stations to the nearest foot +/-). |  |  |  |
|  | Streams and rivers are shown, if applicable. |  |  |  |
|  | Railroads are shown, if applicable. |  |  |  |
|  | City limits are shown, if applicable. |  |  |  |
|  | State and county limits are shown, if applicable. |  |  |  |
|  | Destination points are shown at beginning and end of project. |  |  |  |
|  | TIP number is shown in the block on the left end of sheet. |  |  |  |
|  | State Project Number (WBS element), description and F. A number, if applicable are shown for preliminary engineering. |  |  |  |
|  | Tentative R/W and Let dates are shown and match the current schedule. |  |  |  |
|  | Design exception note is shown indicating the design element(s) requiring the exception, if applicable. |  |  |  |
|  | Clearing method note is shown.  *Note: The specific type can be provided if it has been coordinated with the Division.* |  |  |  |
|  | A note is shown stating whether the project is within municipal limits with the name of the municipality or not within municipal limits. |  |  |  |
|  | Vicinity map includes the following:  \_\_\_ Begin and end project or project site labels  \_\_\_ North arrow  \_\_\_ City name and municipal limits  \_\_\_ County names and limits  \_\_\_ Interstate, US and state routes  \_\_\_ Title block  \_\_\_ Offsite detours w/legend |  |  |  |
|  | Symbols for existing, revised and/or proposed traffic signals are shown per the Signal Recommendations. |  |  |  |
|  | Control of access note is shown. |  |  |  |
|  | Areas of the proposed roadway construction for the project (-L- lines, -Y- lines, service roads, detours, etc.) are shaded. |  |  |  |
|  | Typicals |  |  |  |
|  | Indicate whether the pavement design has been received. |  |  |  |
|  | Wedging details are shown for each minimum resurfacing  depth provided in the pavement design. |  |  |  |
|  | Provide milling details and/or key-in details, if applicable. |  |  |  |
|  | Pavement schedule for each alignment matches the final pavement design, if available. |  |  |  |
|  | Pavement composition labels are shown and match the pavement schedule. |  |  |  |
|  | Verify the application rates for each pavement type has been computed correctly based on pavement type and depth. |  |  |  |
|  | Dimensions for proposed typical section elements (i.e. pavement widths, paved and total shoulder widths, ditch widths, median, berm widths, sidewalk, sidepath, etc.) are shown.  Note: Sidepaths must be clearly distinguished from sidewalk and pavement composition shown. |  |  |  |
|  | Slopes for the pavement, shoulders, ditches, berms, cuts and fills are shown. |  |  |  |
|  | Verify dimensions and slopes are consistent with the approved design criteria. |  |  |  |
|  | Dimensions of the existing pavement width is shown. |  |  |  |
|  | Station ranges provided are consistent with the limits  and type of work shown on plan and profile sheets. |  |  |  |
|  | Typical sections reflect whether there will be full depth pavement, widening and/or overlay of existing pavement. |  |  |  |
|  | Grade point shown on each typical section, if applicable. |  |  |  |
|  | Crown point is shown on typical sections, if applicable. |  |  |  |
|  | Grading limit lines are shown. |  |  |  |
|  | The appropriate shoulder section is shown. Note: Graded shoulders should be used for pavement depths greater than 10”. Otherwise, a trench section should be shown. |  |  |  |
|  | Information related to future construction is shown, if applicable. |  |  |  |
|  | Variable widths are shown, where applicable. |  |  |  |
|  | Notes that provide additional information relevant to the typical section are provided, if applicable. |  |  |  |
|  | Bridge typical sections show lane widths, minimum offset to bridge rail, cross slopes, and sidewalk/sidepath, where applicable. |  |  |  |
|  | Phasing for stage constructed bridges is shown, if applicable. |  |  |  |
|  | Typical is shown for roadways under bridges and include the following:  \_\_\_ Width and cross slopes for lanes proposed under this project.  \_\_\_ Width and cross slopes for future lanes, if applicable, based on coordination in Project Initiation.  \_\_\_ Paved offset based on the bridge policy according to Std. 610.01, 610.02 and 610.04, if applicable.  \_\_\_ Distance to the end bent break point based on the bridge policy according to Std. 610.03, if applicable.  \_\_\_ Median width dimension and slopes for the median shoulders and ditch  \_\_\_ Proposed positive protection for interior bents and the required horizontal clearance required, if applicable |  |  |  |
|  | Construction Narrative |  |  |  |
|  | Verify coordination has taken place with the work zone traffic control engineer to ensure there are no major issues with maintaining traffic with the design. |  |  |  |
|  | Verify coordination has taken place with the work zone  traffic control engineer and Division to determine the  appropriate design speed for the detour. |  |  |  |
|  | Horizontal Design |  |  |  |
|  | Verify the proposed horizontal elements meet the approved design criteria. |  |  |  |
|  | Verify the proposed horizontal alignment ties correctly to  the existing alignment provided by Location and Surveys  at the beginning and end of project/construction limits  (coordinates, bearing, etc.). |  |  |  |
|  | Verify whether the project ties correctly to adjacent projects (i.e. station, coordinates, coordinate equalities, bearing). |  |  |  |
|  | Verify the storage lengths for right and left turn lanes are consistent with Congestion Management recommendations. |  |  |  |
|  | Verify turn lanes storage and tapers lengths provide adequate deceleration. |  |  |  |
|  | Verify coordination has taken place with the Signing and Delineation Designer to review the Traffic Operations Analysis Technical memo and proposed lane configuration. |  |  |  |
|  | Verify the correct superelevation rate is applied to each horizontal radius. |  |  |  |
|  | Verify the superelevation runoff has been calculated correctly.  *Note: Use AASHTO guidance concerning the determination of the number of lanes rotated.* |  |  |  |
|  | Verify the superelevation runoff has been distributed  appropriately per the Roadway Standard Drawings. |  |  |  |
|  | Verify the increment lengths used for superelevation transition are correct. |  |  |  |
|  | Verify the superelevation on structures does not exceed  6%. |  |  |  |
|  | Coordinate with the hydraulic engineer to verify there  are no hydroplaning concerns that could be addressed  with horizontal design changes. |  |  |  |
|  | Verify the superelevation for -Y- lines are transitioning so that it matches the grade on the intersecting roadway. |  |  |  |
|  | For widening projects, verify the horizontal alignment is  set such that it minimizes the need for removal of  existing pavement. |  |  |  |
|  | For widening projects, verify the horizontal alignment is developed in such a way as to minimize the number of crossovers needed to maintain traffic. |  |  |  |
|  | Verify the ramp and loop alignments tie to the edge of travel for the mainline. |  |  |  |
|  | Verify the design provides lane continuity throughout the project. |  |  |  |
|  | Verify the gore areas for interchanges are laid out per NCDOT standard drawings. |  |  |  |
|  | Verify adequate acceleration and deceleration length are provided for ramps and/or loops. |  |  |  |
|  | Verify there is adequate sight distance at ramp terminals and structures at interchange locations. |  |  |  |
|  | Verify there has been coordination concerning future TIP projects when determining bridge length. |  |  |  |
|  | Verify the appropriate horizontal clearances to bridge piers, vertical abutments, retaining walls, and median barrier have been provided. |  |  |  |
|  | Verify guardrail, cable guiderail and/or barrier is shown for bridge piers, culverts, large pipe, sign supports and other fixed objects per the Roadway Design Manual and NCDOT Standard Drawings. |  |  |  |
|  | Verify there are no obstructions in the deflection zone. |  |  |  |
|  | Verify guardrail is shown for ponds, rivers and other water related hazards greater than 2’. |  |  |  |
|  | Verify the appropriate length of guardrail is provided for fill height warrants. |  |  |  |
|  | Verify the possibility of flattening slopes to reduce guardrail was investigated. |  |  |  |
|  | Verify the use of false cuts to reduce guardrail was investigated. |  |  |  |
|  | Verify the guardrail locations shown in the plans and cross sections match each other. (For projects not developed in ORD). |  |  |  |
|  | Verify that guardrail and barrier is placed at the top and bottom of a retaining wall in accordance with the Roadway Design Manual. |  |  |  |
|  | Verify the alignments for -Y- lines, detours and driveways are tied correctly to other alignments. |  |  |  |
|  | Verify there is adequate sight distance at the intersections. |  |  |  |
|  | Verify that intersections and u-turn movements accommodate the appropriate design vehicle. |  |  |  |
|  | Verify roundabout designs are developed with consideration to guidance provided in NCHRP 672. |  |  |  |
|  | Investigate the feasibility of using retaining walls to minimize impacts. |  |  |  |
|  | Verify retaining wall envelopes are developed per the Roadway Design Manual and Geotechnical Standard Drawings and Specifications. |  |  |  |
|  | Verify the use of a handrail or fence is not needed on the top of a retaining wall adjacent to pedestrian and bicycle facilities. |  |  |  |
|  | Vertical Design |  |  |  |
|  | Verify the vertical design elements meet the approved design criteria. |  |  |  |
|  | Verify the proposed grades tie correctly to either the  existing or the minimum resurfacing elevation. |  |  |  |
|  | Verify the proposed grades are within 0.5% of the existing grade at the tie in location. |  |  |  |
|  | Verify the proposed grade does not exceed a 5% rollover where it intersects another roadway. |  |  |  |
|  | Verify whether the proposed grades tie correctly to the proposed grade for adjacent projects. |  |  |  |
|  | Verify the proposed grades do not undercut existing pavement. |  |  |  |
|  | Verify the appropriate vertical clearance has been met for bridges over roadways and railroads. |  |  |  |
|  | Verify with the hydraulic engineer that the proposed grade at bridge locations is not hydraulically controlled. |  |  |  |
|  | Verify the low point of a sag vertical curve is not on a bridge. |  |  |  |
|  | Verify the proposed grade provides adequate cover for culverts identified in the hydraulic planning report. |  |  |  |
|  | Verify the low point of a sag vertical curve does not coincide with 0% superelevation. |  |  |  |
|  | Verify there is not a sag vertical curve in a cut section. |  |  |  |
|  | Verify the proposed grades account for information from the Geotechnical screening report, if provided, due to known concerns for soil conditions. |  |  |  |
|  | Coordinate with the hydraulic engineer concerning  potential hydroplaning concerns at intersections. |  |  |  |
|  | Verify with the hydraulic engineer that the vertical curve lengths do not cause a hydroplaning issue. |  |  |  |
|  | 3D Model/XSC |  |  |  |
|  | Verify station, existing ground line, and existing centerline elevations are shown for each cross section. |  |  |  |
|  | Verify slopes for pavement (EOT to EOT), median ditch,  front and back slope of standard roadway ditches, and  cut and fill slopes are shown. |  |  |  |
|  | Verify proposed pavement depths match what is shown in the typical sections/final pavement design. (For projects not developed in ORD) |  |  |  |
|  | Verify proposed elevations shown for roadway ditches and gutter elevations for proposed curb and gutter. |  |  |  |
|  | Verify guardrail and the associated shoulder widening are shown where applicable. |  |  |  |
|  | Verify guardrail locations match what is shown on the plan sheets. (For projects not developed in ORD) |  |  |  |
|  | Verify cross-sections are checked to assure adequate sight distances. |  |  |  |
|  | Verify the cross sections are reflective of the 3D model. (For projects not developed in ORD) |  |  |  |
|  | Verify the slopes from the 3D model/cross sections match the slope stakes. (For projects not developed in ORD) |  |  |  |
|  | Plan Sheets |  |  |  |
|  | Design speed is shown only for horizontal curves which do not meet proposed design speed. |  |  |  |
|  | Design exception note is shown on the plan sheet(s)  indicating the criteria requiring the exception. |  |  |  |
|  | Superelevation transitions are shown and are consistent with standards. |  |  |  |
|  | Low and high points of the vertical alignment are clearly shown on the plans.  *Note: These labels are for hydraulic review only and*  *should be removed before the “Recommendation Plan*  *Set” are distributed.* |  |  |  |
|  | Beginning and ending TIP project stations are shown on first and last plan sheet and agree with title sheet and typical sections. |  |  |  |
|  | Beginning and ending construction stations for -Y- lines and their station ties with main line. |  |  |  |
|  | North arrow with the correct datum is shown on each sheet. |  |  |  |
|  | Bearings for the horizontal alignment are shown on the sheets, if applicable. |  |  |  |
|  | Curve data with superelevation and runoff shown on the sheets where the horizontal curve appears, if applicable. |  |  |  |
|  | Proposed pavement (EOT and EOP) and median widths are labeled at the beginning and end of each sheet and where there are tapers/transitions. |  |  |  |
|  | Detour alignments shown on plan sheets with a reference to the appropriate detour detail sheet(s). |  |  |  |
|  | Service roads recommended based on service road  studies are shown, if applicable. |  |  |  |
|  | Traffic diagrams are shown for intersections where a traffic forecast was provided, if applicable. |  |  |  |
|  | Existing pavement width and type is shown on each  sheet. |  |  |  |
|  | Existing streets, roads and driveways are shown. |  |  |  |
|  | Existing right of way and easements, property lines, property owners and deed/plat information are shown. |  |  |  |
|  | All existing utilities are shown (Top and invert elevations and pole numbers are not shown.) |  |  |  |
|  | The wetlands and jurisdictional streams are shown, if applicable. |  |  |  |
|  | Cross reference notes to the profile sheets are shown and correct. |  |  |  |
|  | Symbols for existing, revised and/or proposed traffic signals per recommendations are shown on the plan sheets, if applicable. |  |  |  |
|  | Limits of paved shoulders at intersections are shown. |  |  |  |
|  | Slope stakes are shown and labeled. |  |  |  |
|  | Proposed right of way, control of access, temporary easements, and control of access breaks are shown. |  |  |  |
|  | Access points for partial control of access facilities are shown and begin and end stations labeled, if applicable. |  |  |  |
|  | Pavement removal locations outside of slope stakes are shown as cross hatched. |  |  |  |
|  | Driveway connections are shown, if applicable. |  |  |  |
|  | Driveway alignments have been developed for connections that are not replaced in their existing location or that cannot be tied within proposed right of way with a grade less than 10%. |  |  |  |
|  | Curb cuts are shown for driveways along a curb and gutter project. |  |  |  |
|  | Baseline data is shown (point symbol and point number only). |  |  |  |
|  | Benchmarks are shown (symbol and benchmark number only). |  |  |  |
|  | Verify investigation of potential retaining wall locations has been completed, if applicable. |  |  |  |
|  | Retaining wall envelopes have been developed for the locations shown in the distributed “Recommendation Plan Set”. |  |  |  |
|  | Stations for the begin and end approach slabs and bridges are not shown. |  |  |  |
|  | Equality station and skew angle are shown for bridges over roadways, if applicable. |  |  |  |
|  | Notes where sight distance grading is required at intersections are shown, if applicable. |  |  |  |
|  | Interchange Sheets (if applicable) |  |  |  |
|  | Interchange sheets properly matched with adjacent plan sheet with no overlapping coverage, if possible. |  |  |  |
|  | The correct scale is shown on the interchange sheets. |  |  |  |
|  | Verify all items listed under plan sheets have been addressed on the interchange sheets. |  |  |  |
|  | Detour Sheets (if applicable) |  |  |  |
|  | A cross reference note to the appropriate plan/profile sheet(s), if applicable. |  |  |  |
|  | Proposed alignment to which a detour alignment is tied is  shown with equality stations on the detour detail sheet.  Note: Curve data is not required. |  |  |  |
|  | Profile Sheets |  |  |  |
|  | Design speed is shown for only for vertical curves which do not meet proposed design speed, if applicable. |  |  |  |
|  | Design exception note is shown on the profile sheet(s)  indicating the criteria requiring the exception, if  applicable. |  |  |  |
|  | Low and high points of the vertical alignment is clearly identified on the profile sheets.  *Note: These labels are for hydraulic review only and should be removed before the “Recommendation Plan Set” are distributed.* |  |  |  |
|  | Begin and end station of grades are shown for all alignments. |  |  |  |
|  | Benchmark descriptions are shown in their approximate  location on the profile sheets. |  |  |  |
|  | Cross Section Sheets |  |  |  |
|  | Cross section index of sheets is provided if there is more  than one proposed alignment. |  |  |  |
|  | Scale shown on each cross section sheet. |  |  |  |
|  | Note is shown on first cross section: "preliminary plans  do not use for construction" and "do not use for right of  way acquisition" |  |  |  |

*For items marked* ***No*** *that require further explanation, provide comments or action items in the table below.*

| **Item #** | **Comments and Action Items** |
| --- | --- |
| Click to edit. | Click to edit. |

|  |  |  |  |
| --- | --- | --- | --- |
| ***This checklist may not be comprehensive to every project. It is the responsibility of the reviewer to ensure that an adequate review is performed.*** | | | |
| **QC Reviewer Name:** | | Click to edit. | **Date:** | Click to edit. | |
| **QC Reviewer (Signature):** | |  |  |  | |