

## Document Release Notice

|                     |           |                 |   |   |
|---------------------|-----------|-----------------|---|---|
| Document Number:    | SD-03     | Title:          | Schematic Geometric Design  |   |
| Current Revision #: | 0         | Type of Change: | <input type="checkbox"/> ORIG RELEASE <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> ARCHIVE <input type="checkbox"/> OBSOLETE |   |
| New Revision #:     | 1         | DRN Number:     | 10288   | <input type="checkbox"/> MAJOR <input checked="" type="checkbox"/> MINOR <input type="checkbox"/> ADMIN |
| Date Submitted:     | 2/23/2011 | Document Type:  | QMS Document - SD   | Choose from Drop Down Menu - left   |

**Summary of Proposed Changes:**

- Include paragraph numbers or other references & attach a copy of the new or revised documents)
- For new documents, indicate "Original Release"

(1) Removed Guiding Principle.

*SEE MINOR COMMENTS MANAGED. Anab*

**Reason for New Release / Revision / Obsolescence:**

NTTA organizational changes.

*see comments*

**Required Signatures:**

| Title                    | Printed Name    | Signature | Date       |
|--------------------------|-----------------|-----------|------------|
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| Process or Content Owner | Darla Payberah  |           | 3/13/2011  |
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| NTTA Manager             | Mark Bouma      |           | 4-1-11     |
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| Document Control         | Md Omar Faruk   |           | 05/17/2011 |



From: EPDS  
Sent: Tuesday, May 17, 2011 3:53 PM  
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**Subject:** PMO Form: Online QMS Manual Semi Annual update (#290), For your information

|                                       |   |
|---------------------------------------|---|
| <b>Document:</b>                      | <b>PMO Form: Online QMS Manual Semi Annual update (#290)</b>  |
| <b>Workspace:</b>                     | PROJECT: Notifications Project (#123NOTIFY)   |
| <b>From:</b>                          | Proliance Notification  |
| <b>Date Sent (Project Time Zone):</b> | 05/17/2011 3:49 PM (GMT -05:00)   |
| <b>Action by:</b>                     | Jack Harper (NTTA)  |
| <b>Action taken:</b>                  | Transitioned from - Draft   |
| <b>Current state:</b>                 | <b>Submitted</b>  |
| <b>Priority:</b>                      | Normal  |
| <b>Expected Action:</b>               | none  |
| <b>Due Date:</b>                      | none  |
| <b>Message:</b>                       | Project Delivery Document Control announces the Semi Annual Release of the online QMS Manual. Inside this EPDS Notification document is a list of all documents that have been revised in the QMS Manual. Please review to familiarize yourself with any changes. |

People receiving this notice:

| <b>Name</b>       | <b>Department</b> | <b>Expected Action</b> |
|-------------------|-------------------|------------------------|
| Aaron Kwast       | HDR Engineering   | none                   |
| Abas Kakesh       | KBR               | none                   |
| Abulkhair Zobayed | KBR               | none                   |
| Adam Henderson    | Webber            | none                   |
| Adam Keckler      | Webber            | none                   |



**MEMORANDUM**

**Date:** May 16, 2011  
**To:** All EPDS Users  
**From:** Elizabeth Mow, P.E., Director of Project Delivery *EM*  
**Subject:** QMS Manual Updates

The following documents have been released to the QMS Manual. Please note that training has occurred before the release was made and/or is scheduled to occur on all major changes, within the month of May. Regarding the minor changes, if your role requires your involvement in the execution of the document, it is now your responsibility to retrieve the latest version from the QMS manual and familiarize yourself with the changes. Upon review, if you determine you require further clarification or training, it is your responsibility to contact the project delivery business process owner for the same.

The QMS Manual is available at:

<http://www.ntta.org/WorkingWithUs/NTTA+QMS+Manual+and+Forms/>

| Document # | Document Title  | DRN#  | Type of change | Description of Change   |
|------------|---|-------|----------------|---|
| CA-01      | Procurement – Professional Services   | 10302 | Minor          | Section 2.0 Updated responsibility titles for NTTA Project Delivery Contracts Manager. Added PD Program Controls Manager. Section 6.1 Clarify processes for project controls review. Added Legal Form link. Section 6.1.2 Added details relating ICE and negotiation commencement. CA-01-F18 Expanded Contract Checklist to include WA/SA. Updated flowchart. |
| CA-02      | Invoicing and Payment   | 10297 | Major          | Update to all sections of the QMS Invoicing and Payment Procedures. Deletion of link to Payment Recommendation Transmittal (PRT). Update to Forms. Corresponding update to Procedure Flow Chart.  |
| CA-03      | Professional Services Change Management   | 10303 | Minor          | Update to Procedures to align with staffing changes and clarification to current procedures to decrease routing time and improve workflow efficiency. Corresponding update to Procedure Flow Chart.   |
| CA-04      | Contract Closeout- Professional Services, Goods and Services, and Consulting Services | 10268 | Minor          | Update to Procedures to align with staffing changes and clarification to current procedures to increase preparation accuracy, decrease routing time and improve workflow efficiency. Corresponding update to Procedure Flow Chart.  |

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| CA-06  | Professional Services Work Authorization Development and Execution | 10305 | Minor | Update to Procedures to document implementation and clarify function of current procedures. Project Controls revision will provide more timely financial details to the Manager and staff. Update will reduce routing time and increase workflow efficiency. Corresponding update to Procedure Flow Chart. |
| CA-07  | Procurement-Deign Bid Build Construction                           | 20306 | Minor | Update to include Project Delivery Contracts Manager position. Form addition to add departments to the Distribution List. Revisions made to Bid Opening Checklist to include verifying Bid Amount within Budget. Corresponding update to Procedure Flow Chart.   |
| CA-08  | Independent Cost Estimate Process                                  | 10300 | Minor | Modify procedures to address recent organizational changes and to update forms and flow chart to reflect current practices.  |
| CON-01 | Construction RFI Review Process                                    | 10293 | Minor | Changed for Construction Manager to close out RFIs not the Contractor in QMS Procedure, either currently allowed in EPDS. Updated titles and clarified existing workflow.  |
| CON-02 | Construction Submittal Review Process                              | 10267 | Minor | Revised titles to current NTTA structure and clarifications. No change in procedure or signature. Changed CM to Construction Manager on Business Process Workflow chart. Added CON-02-A2 to 9.0 Component Documents. Updated CON-02-A1   |
| CON-03 | Construction Change Order (CO) Process                             | 10301 | Minor | Revised titles to match current NTTA employees. Split CON-03-F1 into CON-03-F7 (Original Release) version to satisfy recent NTTA Finance Department request, but process is really unchanged, just same data presented concisely. Clarified Change Order procedure to match current actual process.        |
| CON-04 | Construction Administration  | 10294 | Minor | Updated titles to current NTTA structure and added CON-04-A1 and CON-04-A2   |
| CON-06 | Construction Contract Closeout                                     | 10281 | Minor | No change to process, but adjusted titles to current NTTA structure.   |
| CON-07 | Control of Nonconforming Items during Construction                 | 10307 | Minor | Original Issue – This procedure was originally QM-09 Control of Nonconforming Product which has been made obsolete.  |
| DM-01  | Management of Controlled Documentation                             | 10264 | Minor | Revision done due to recent organizational changes in the Project Delivery Department and current business practices. Updated 2.0 Responsibilities, 6.0 Procedures, and 10.0 Work Flow, Replaced PMO with PD.  |
| DM-02  | Project Delivery Records Management Requirements                   | 10266 | Minor | Revision done due to recent organizational changes in the Project Delivery Department and current business practices. Updated 2.0 Responsibilities, 6.0 Procedures, and 10.0 Work Flow, Replaced PMO with PD.  |



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| ENV-03-A1 | EPDS ENV NCR Work Flow  | 10259 | Admin | Revision done due to recent organizational changes in the Project Delivery Department and current business practices.  |
| FD-01     | PS&E Development Review and Approval  | 10296 | Major | NTTA organization changes. Deleted Guiding Principles, Updated roles and responsibilities, included procedure to EPDS submittals, updated flow charts.   |
| FD-03     | NTTA Special Specification, Special Provisional and General Note Management | 10282 | Minor | NTTA organization changes. Updated functional titles, removed unnecessary acronyms, revised NTTA Legal Counsel responsibilities, aligned procedures to current workflow, added QM-12 as a reference. |
| FD-04     | NTTA Standards Management   | 10283 | Minor | NTTA organization changes. Updated new/replaced roles, referenced new procedures and made revisions for clarity. Updated flow chart.   |
| FD-06     | Design Criteria   | 10284 | Minor | NTTA organization changes. Updated new/replaced roles and made revisions for clarity.  |
| FD-07     | Constructability Review   | 10285 | Minor | NTTA organization changes. Updated new/replaced roles and made minor revisions for clarity.  |
| PC-02     | Cost Estimates  | 10265 | Minor | Revised to reflect current business practices. Eliminated Program Managers role in 2.0, and updated title of Cost Estimate template to "NTTA Project Estimating Template" in Section 9.0             |
| PC-06     | Schedule Management   | 10279 | Minor | Revised to reflect current business practices. Revised Section 2.2 to current organizational chart, revised 6.11, 6.13, 6.14, 6.15, and PC-06-F1 to comply with organization changes.                |
| PC-08     | Budget, Schedule and Forecast Meeting                                       | 10280 | Minor | Revised to reflect current business practices relative to organization chart for NTTA Project Delivery and revised process followed for corridor/project status meetings.                            |
| PI-01     | Media Relations Process   | 10269 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Changed PIO to Media Relations Manager.   |
| PI-02     | Stakeholder Advisory Groups   | 10270 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Removed reference to Assistant Director of Government Affairs.  |
| PI-03     | Stakeholder Communications  | 10271 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Updated 6.1 presentation venue information.   |
| PI-04     | Public Meetings   | 10272 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Added Project Communications Manager to oversight process.  |
| PI-05     | Public Hearings   | 10273 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Inclusion of additional TX Administrative Code options and addition of PCM in oversight.                        |



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| PI-06    | Corridor Progress Reports (CPR)                 | 10274 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Removal of SPOC terminology.  |
| PI-07    | PI Plan Development                             | 10275 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Removal of Program Management Office terminology.   |
| PI-08    | Graphics Production                             | 10276 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Removed graphic designer references and replaced with graphic supervisor language.  |
| PI-10    | Meeting Minutes and Synopsis Approval           | 10277 | Minor | Revised to reflect current business practices. Requested Review by Project Delivery. Realignment of process.   |
| QM-02    | Corridor/Project Quality Plan Requirements      | 10298 | Minor | Revised to reflect current business practices. PMO changed to Project Delivery (PD). PMO Construction Oversight Manager to the Construction Oversight Manager, PMO Deputy Program Manager changed to the Program Controls Manager, PMO Assistant Program Manager changed to PD Contracts Manager. Assistant Executive Director removed from the required approval. Table Two updated to reflect the changes. |
| QM-04    | Management Review                               | 10299 | Minor | Removed guiding principles and updated scope applicability.  |
| QM-09    | Control of Nonconforming Product – Construction | 10314 | Minor | Obsolete   |
| QM-12    | Control of QMS Management                       | 10295 | Minor | Removed guiding principles and updated scope applicability. Updated 3.0 Responsibilities; Deleted the Asst. Exec Director, Deputy Program Manager, Project Delivery IT Liaison. Added NTTA Functional Managers. Clarification added to Section 6.0   |
| ROW-01   | ROW Surveying and Mapping                       | 10315 | Minor | Added items 2.4, ROW Development Manager Responsibilities and Item 6.5, NTTA Review and Approval of ROW documents  |
| SD-01    | Conceptual Alternatives Analysis                | 10286 | Minor | Removed guiding principles; Replaced Design Manager Staff with NTTA Design Manager; Removed PD Design Management staff; replaced DPM with NTTA Design Manager.   |
| SD-02    | Schematic Level Traffic Analysis                | 10287 | Minor | Removed guiding principles and updated 3.0 scope applicability.  |
| SD-03    | Schematic Geometric Design                      | 10288 | Minor | Removed guiding principles and updated 3.0 scope applicability and 6.0 Procedures.   |
| SD-04    | Schematic Review Process                        | 10289 | Minor | Updated roles new/replaced roles and provided minor revisions for clarity.   |
| SD-04-A1 | EPDS Design Packages Schematic Process Flow     | 10316 | Minor | Updated the reference card.  |

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| SD-05 | Value Engineering                                     | 10290 | Minor | Removed guiding principles and included VE activities to be conducted, abbreviation of Director of Project Delivery to "DPD", and Replaced DPM and PM with NTTA Design Manager.  |
| SD-06 | Schematic Design                                      | 10291 | Minor | NTTA organizational changes. Dispute Resolutions is the responsibility of the DF Manager, replaced Visual Quality Assurance Manager with PD Visual Quality Manager, changed PMO VQ Manager "approval" of VQAM to "recommendation".   |
| UC-01 | Utility Relocation Process                            | 10278 | Minor | Update the current Utility Relocation Procedure to reflect actual NTTA titles and responsibilities for approval of utility relocations.  |
| VQ-01 | Precast Manufacturing Plant Visual Quality Inspection | 10257 | Major | Original Release- procedures describes the Visual Quality inspection, documentation, and reporting required for Precast manufacturing plant inspection. Needed to establish the procedure.   |
| VQ-02 | Construction Site Visual Quality Inspection           | 10258 | Major | Original Release - procedures describes the Visual Quality inspection, documentation, and reporting required of the Construction Site Quality Visual Assurance inspector prior to the placement of structural concrete for cast-in-place and precast structure elements. Needed to establish a procedure within the QMS for Construction Site Visual Quality inspection. |
| VQ-03 | Visual Quality Control of Nonconforming Product       | 10308 | Major | Original Release - removed from QM-09 Control of Nonconforming Product-Construction  |

If you have any questions or need additional information regarding the above release, please do not hesitate to call Md Omar Faruk at 214-224-2439.

cc: ljay Nkele  
Mike Hutchison  
Troy Federspiel  
Md Omar Faruk



|                                   |                                 |             |
|-----------------------------------|---------------------------------|-------------|
| NTTA Projects                     | Original Issue Date: 06/05/2008 | SD-03       |
| Resource: Schematic Design        | Revision 1 Issue Date: TBD      | Page 1 of 3 |
| Title: Schematic Geometric Design |                                 |             |

## 1.0 PURPOSE:

The purpose of this procedure is to define the requirements for producing schematic geometric design including associated cost estimates, cross-sections, hydraulic analysis and preliminary drainage design.

All schematic geometric design for NTTA projects shall comply with the procedures established herein.

## 2.0 RESPONSIBILITIES:

**2.1** Corridor Manager (CM)/Project Manager – The CM/Project Manager shall be responsible for overseeing the efforts of the DSE to ensure compliance with the requirements of this procedure.

**2.2** Design Section Engineer (DSE) – The DSE shall be responsible for performing all processes listed below in the procedure.

**2.2.3** NTTA Design Manager – The NTTA Design Manager shall be responsible for assisting CM/Project Managers with ensuring the understanding and implementation of this procedure.

## 3.0 SCOPE/APPLICABILITY:

This procedure shall apply to all NTTA projects and corridors within the Project Delivery Department.

## 4.0 REFERENCES:

- A Policy on Geometric Design of Highways and Streets, AASHTO
- Conceptual Alternatives Evaluation Report
- NTTA CAD Guidelines
- NTTA and TxDOT CAD Standards (local municipal, if applicable)
- NTTA Design Guidelines
- NTTA Maintenance Design Guidelines Manual
- NTTA Sign and Traffic Control Device Guidelines Manual
- NTTA Sign Policy Manual
- Texas Manual on Uniform Traffic Control Devices
- TxDOT Access Management Manual
- TxDOT Bridge Project Development Manual
- TxDOT Design Exception Questionnaire
- TxDOT Hydraulic Design Manual
- TxDOT Roadway Design Manual
- [PC-02](#) Cost Estimate procedure
- [PC-02-F1](#) NTTA Cost Estimating Template

*Danka made the final changes according to EM's comments - 4/27/2011*



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- [SD-03-A1](#) TxDOT Advanced Project Development Design Schematic Checklist
- [SD-04](#) Schematic Review Process
- [SD-05](#) Value Engineering

## 5.0 DEFINITIONS & ACRONYMS

### 6.0 PROCEDURES:

- 6.1 Schematic Design Criteria** – The DSE shall establish design criteria in accordance with *TxDOT's Roadway Design Manual* and *A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO)*. Design criteria shall include roadway classification, horizontal alignment, vertical alignment, and cross section design elements. The source (reference, page or figure/table number) of each design criteria element shall be documented in the design criteria table.
- 6.2 Schematic Geometric Design** – The geometric design schematic shall include the items described in SD-03-A1, Advance Project Development Design Schematic Checklist and SD-04-F2, Draft Final and Final Schematic Checklist.
- 6.3 Level E Cost Estimate** – The DSE shall develop a Level E cost estimate – current dollars/year and escalated to mid-term of construction – in accordance with PC-02, *Cost Estimate procedure*, and based on dates provided by the NTTA. The estimate shall include ROW and utility relocation costs in accordance with the *NTTA Cost Estimating Template* and shall be submitted with the design schematic submittal.
- 6.4 Cross Sections** – The DSE shall prepare “working” cross sections at approximately 100-foot intervals to confirm proposed ROW, where necessary, and to detail preliminary earthwork.
- 6.5 Construction Staging Schematic** – The DSE shall develop a simple sequence of construction, including the method for handling traffic during each phase of the design schematic using colorization for traffic and construction areas.
- 6.6 Preliminary Signing Schematic** – The DSE shall prepare a preliminary signing schematic for the entire project in accordance with *A Policy on Geometric Design of Highways and Street, AASHTO* and/or the *Texas Manual of Uniform Traffic Control Devices*.
- 6.7 Design Exceptions** – In the event the geometric design requires design exceptions, design exception documentation, in a similar format to *TxDOT's Request for Design Exception Questionnaire*, shall be prepared.
- 6.8 Hydraulic Analysis/Preliminary Drainage Design** – A preliminary hydraulic modeling/analysis shall be performed within the approved study area. This analysis shall be conducted utilizing USGS topographic



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maps and available contour data, determine preliminary drainage areas, 50-year and 100-year discharges using rational or regression methods, as well as size of preliminary cross drainage structures to verify roadway profile. Preliminary drainage design shall be in accordance with TxDOT's *Hydraulic Design Manual*. It is important to note that if affected, local municipalities have more stringent design standards and therefore, NTTA requires the adoption of more stringent standards. This task is necessary for proper vertical design of applicable and anticipated bridges and hydraulic structures.

**6.9 Structure Layout/Design** – A preliminary structure layout shall be provided within the approved study area. This layout shall establish all structure locations within the project limits.

**6.10 Submittal of Geometric Schematic for Review and Approval** – Once complete, the DSE shall submit to CM/Project Manager, the geometric schematic design and appropriate checklists which will be distributed to PD design staff for review and comment in accordance with SD-04, *Schematic Review Process*.

**7.0 REGULATORY REQUIREMENTS:**

N/A

**8.0 RELATED BOARD POLICY:**

N/A

**9.0 COMPONENT DOCUMENTS:**

- [SD-03-A1](#) TxDOT Advanced Project Development Design Schematic Checklist
- [SD-04-F2](#) Draft Final and Final Schematic Checklist

**10.0 FLOWCHART:**

N/A

**11.0 REVISION HISTORY:**

| Revision | Revised by:    | Date Issued | DRN                   | Reason for Revision   |
|----------|----------------|-------------|-----------------------|---|
| 0        | Dave Clarke    | 06/05/2008  |                       | Original Issue  |
| 1        | Darla Payberah | TBD         | <a href="#">10288</a> | Removed "Guiding Principle". Updated 3.0 Scope/Applicability and 6.0 Procedures |



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**1.0 PURPOSE:**

The purpose of this procedure is to define the requirements for producing schematic geometric design including associated cost estimates, cross-sections, hydraulic analysis and preliminary drainage design.

All schematic geometric design for NTTA projects shall comply with the procedures established herein.

**2.0 RESPONSIBILITIES:**

- 2.1 Corridor Manager (CM)/Project Manager – The CM/Project Manager shall be responsible for overseeing the efforts of the DSE to ensure compliance with the requirements of this procedure.
- 2.2 Design Section Engineer (DSE) – The DSE shall be responsible for performing all processes listed below in the procedure.

*+ design manager*

**3.0 SCOPE/APPLICABILITY:**

This procedure shall apply to all NTTA projects and corridors within the Project Delivery Department.

**4.0 REFERENCES:**

- A Policy on Geometric Design of Highways and Streets, AASHTO
- Conceptual Alternatives Evaluation Report
- NTTA CAD Guidelines
- NTTA and TxDOT CAD Standards (local municipal, if applicable)
- NTTA Design Guidelines
- NTTA Maintenance Design Guidelines Manual
- NTTA Sign and Traffic Control Device Guidelines Manual
- NTTA Sign Policy Manual
- Texas Manual on Uniform Traffic Control Devices
- TxDOT Access Management Manual
- TxDOT Bridge Project Development Manual
- TxDOT Design Exception Questionnaire
- TxDOT Hydraulic Design Manual
- TxDOT Roadway Design Manual
- PC-02 Cost Estimate procedure
- PC-02-F1 NTTA Cost Estimating Template
- SD-03-A1 TxDOT Advanced Project Development Design Schematic Checklist
- SD-04 Schematic Review Process
- SD-05 Value Engineering

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## 5.0 DEFINITIONS & ACRONYMS

### 6.0 PROCEDURES:

- 6.1 **Schematic Design Criteria** – The DSE shall establish design criteria in accordance with *TxDOT's Roadway Design Manual* and *A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO)*. Design criteria shall include roadway classification, horizontal alignment, vertical alignment, and cross section design elements. The source (reference, page or figure/table number) of each design criteria element shall be documented in the design criteria table.
- 6.2 **Schematic Geometric Design** – The geometric design schematic shall include the items described in SD-03-A1, Advance Project Development Design Schematic Checklist and SD-04-F2, Draft Final and Final Schematic Checklist.
- 6.3 **Level E Cost Estimate** – The DSE shall develop a Level E cost estimate – current dollars/year and escalated to mid-term of construction – in accordance with PC-02, *Cost Estimate procedure*, and based on dates provided by the NTTA. The estimate shall include ROW and utility relocation costs in accordance with the *NTTA Cost Estimating Template* and shall be submitted with the design schematic submittal.
- 6.4 **Cross Sections** – The DSE shall prepare “working” cross sections at approximately 100-foot intervals to confirm proposed ROW, where necessary, and to detail preliminary earthwork.
- 6.5 **Construction Staging Schematic** – The DSE shall develop a simple sequence of construction, including the method for handling traffic during each phase of the design schematic using colorization for traffic and construction areas.
- 6.6 **Preliminary Signing Schematic** – The DSE shall prepare a preliminary signing schematic for the entire project in accordance with *A Policy on Geometric Design of Highways and Street, AASHTO* and/or the *Texas Manual of Uniform Traffic Control Devices*.
- 6.7 **Design Exceptions** – In the event the geometric design requires design exceptions, design exception documentation, in a similar format to *TxDOT's Request for Design Exception Questionnaire*, shall be prepared.
- 6.8 **Hydraulic Analysis/Preliminary Drainage Design** – A preliminary hydraulic modeling/analysis shall be performed within the approved study area. This analysis shall be conducted utilizing USGS topographic maps and available contour data, determine preliminary drainage areas, 50-year and 100-year discharges using rational or regression methods, as well as size of preliminary cross drainage structures to verify roadway profile. Preliminary drainage design shall be in accordance with *TxDOT's Hydraulic Design*



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*Manual.* It is important to note that if affected, local municipalities have more stringent design standards and therefore, NTTA requires the adoption of more stringent standards. This task is necessary for proper vertical design of applicable and anticipated bridges and hydraulic structures.

**6.9 Structure Layout/Design** – A preliminary structure layout shall be provided within the approved study area. This layout shall establish all structure locations within the project limits.

**6.10 Submittal of Geometric Schematic for Review and Approval** – Once complete, the DSE shall submit to CM/Project Manager, the geometric schematic design and appropriate checklists which will be distributed to PD design staff for review and comment in accordance with SD-04, *Schematic Review Process*.

**7.0 REGULATORY REQUIREMENTS:**

N/A

**8.0 RELATED BOARD POLICY:**

N/A

**9.0 COMPONENT DOCUMENTS:**

- [SD-03-A1](#) TxDOT Advanced Project Development Design Schematic Checklist
- [SD-04-F2](#) Draft Final and Final Schematic Checklist

**10.0 FLOWCHART:**

N/A

**11.0 REVISION HISTORY:**

| Revision | Revised by:    | Date Issued | DRN                   | Reason for Revision   |
|----------|----------------|-------------|-----------------------|---|
| 0        | Dave Clarke    | 06/05/2008  |                       | Original Issue  |
| 1        | Darla Payberah | TBD         | <a href="#">10288</a> | Removed "Guiding Principle". Updated 3.0 Scope/Applicability and 6.0 Procedures |

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|-----------------------------------|---|--|
| NTTA Projects                     | Original Issue Date: 06/05/2008                     | SD-03                                  |
| Resource: Schematic Design        | Revision <u>01</u> Issue Date: <u>06/05/2008TBD</u> | <del>3</del> -pages <u>Page 1 of 3</u> |
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**1.0 PURPOSE:**

The purpose of this procedure is to define the requirements for producing schematic geometric design including associated cost estimates, cross-sections, hydraulic analysis and preliminary drainage design.

**2.0 GUIDING PRINCIPLE:**

All schematic geometric design for NTTA projects shall comply with the procedures established herein.

**3.02.0 RESPONSIBILITIES:**

3.12.1 Corridor Manager (CM) ~~and~~ Project Manager – The CM/Project Managers and project managers shall be responsible for overseeing the efforts of the DSE to ensure compliance with the requirements of this procedure.

3.22.2 Design Section Engineer (DSE) – The DSE shall be responsible for performing all processes listed below in the procedure.

**4.03.0 SCOPE/APPLICABILITY:**

This procedure shall apply to all NTTA projects and corridors within the Project Delivery Department.

**5.04.0 REFERENCES:**

- TxDOT Highway Design Division Roadway Design Manual
- AASHTO A Policy on Geometric Design of Highways
- SD-03-A1 TxDOT Design Schematic Checklist
- NTTA Design Standards and Specifications
- Conceptual Alternatives Evaluation Report
- PC-02-F1 NTTA Cost Estimating Template
- Texas MUTCD
- TxDOT Design Exception Questionnaire
- TxDOT Hydraulic Design Manual
- PC-02 Cost Estimates procedure
- Local municipality Design Standards
- SD-04 Schematic Review Process

**6.05.0 DEFINITIONS & ACRONYMS**



|                                   |  |                     |
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7.06.0 PROCEDURES:

7.16.1 **Schematic Design Criteria** – The DSE shall establish design criteria in accordance with *TxDOT Highway Design Division Roadway Design Manual* and *AASHTO A Policy on Geometric Design of Highways*. Design criteria shall include roadway classification, horizontal alignment, vertical alignment, and cross section design elements. The source (reference, page or figure/table number) of each design criteria element shall be documented in the design criteria table.

*and Streets*

7.26.2 **Schematic Geometric Design** – The geometric design schematic shall comply with TxDOT schematic requirements (*Design Schematic Checklist*) and the *NTTA Design Standards*.

7.36.3 **Level E Cost Estimate** – The DSE shall develop a Level E cost estimate – current dollars/year and escalated to mid-term of construction – in accordance with *PC-02 Cost Estimate procedure* and based on dates provided by the NTTA. The estimate shall include ROW and utility relocation costs in accordance with the *NTTA Cost Estimating Template* and shall be submitted with the design schematic submittal.

7.46.4 **Cross Sections** – The DSE shall prepare “working” cross sections at approximately 100-foot intervals to confirm proposed ROW, where necessary, and to detail preliminary earthwork.

7.56.5 **Construction Staging Schematic** – The DSE shall develop a simple sequence of construction schematic and method of handling traffic during each phase of the design schematic using colorization for traffic and construction areas.

7.66.6 **Preliminary Signing Schematic** – The DSE shall prepare a preliminary signing schematic for the entire project in accordance with *AASHTO A Policy on Geometric Design of Highways* and/or the *Texas MUTCD*.

*Land Streets*

7.76.7 **Design Exception Questionnaire** – In the event the geometric design requires design exceptions, a design exception questionnaire in a similar format to TxDOT *Design Exception Questionnaire* shall be prepared.

7.86.8 **Hydraulic Analysis/Preliminary Drainage Design** – A preliminary hydraulic modeling/analysis shall be performed within the approved study area. This analysis shall be conducted utilizing USGS topographic maps and available contour data, determine preliminary drainage areas, 50-year and 100-year discharges using rational or regression methods, as well as size of preliminary cross drainage structures to verify roadway profile. Preliminary drainage design shall be in accordance with TxDOTs *Hydraulic Design Manual*. It is important to note that if affected, local municipalities have more stringent design standards and therefore, NTTA requires the adoption of more stringent standards. This task is necessary for proper vertical design of applicable and anticipated bridges and hydraulic structures.

7.96.9 **Structure Layout/Design** – A preliminary structure layout shall be provided within the approved study area. This layout shall establish all structure locations within the project limits.

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| Title: Schematic Geometric Design |   |                                       |

7.106.10 **Submittal of Geometric Schematic for Review and Approval** – Once complete, the DSE shall submit to CM/Project Manager, the geometric schematic design and appropriate checklists which will be distributed to PDMO design staff for review and comment approval in accordance with *SD-04, Schematic Review Process*.

8.07.0 **REGULATORY REQUIREMENTS:**

N/A

9.08.0 **RELATED BOARD POLICY:**

N/A

10.09.0 **COMPONENT DOCUMENTS:**

- SD-03-A1 *TxDOT Design Schematic Checklist*

10.0 FLOWCHART:

N/A

**11.0 REVISION HISTORY:**

| Revision | Revised by:           | Date Issued | Reason for Revision  |
|----------|-----------------------|-------------|--|
| 0        | Dave Clarke           | 06/05/2008  | Original Issue   |
| <u>1</u> | <u>Darla Payberah</u> |             | <u>Removed "Guiding Principle". Updated 3.0 Scope/Applicability and 6.0 Procedures</u> |



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| Title: Schematic Geometric Design |                                 |             |

**1.0 PURPOSE:**

The purpose of this procedure is to define the requirements for producing schematic geometric design including associated cost estimates, cross-sections, hydraulic analysis and preliminary drainage design.

All schematic geometric design for NTTA projects shall comply with the procedures established herein.

**2.0 RESPONSIBILITIES:**

- 2.1 Corridor Manager (CM)/Project Manager – The CM/Project Manager shall be responsible for overseeing the efforts of the DSE to ensure compliance with the requirements of this procedure.
- 2.2 Design Section Engineer (DSE) – The DSE shall be responsible for performing all processes listed below in the procedure.

**3.0 SCOPE/APPLICABILITY:**

This procedure shall apply to all NTTA projects and corridors within the Project Delivery Department.

**4.0 REFERENCES:**

- TxDOT ~~Highway Design Division~~ Roadway Design Manual
- AASHTO A Policy on Geometric Design of Highways and Streets
- SD-03-A1 TxDOT Design Schematic Checklist
- NTTA Design Standards and Specifications [Do not italicize]
- Conceptual Alternatives Evaluation Report
- PC-02-F1 NTTA Cost Estimating Template
- Texas MUTCD
- TxDOT Design Exception Questionnaire
- TxDOT Hydraulic Design Manual
- PC-02 Cost Estimates procedure
- Local municipality Design Standards
- SD-04 Schematic Review Process

FIX TO BE CONSISTENT WITH FD-01

**5.0 DEFINITIONS & ACRONYMS**

**6.0 PROCEDURES:**

- 6.1 **Schematic Design Criteria** – The DSE shall establish design criteria in accordance with *TxDOT Highway Design Division Roadway Design Manual* and *AASHTO A Policy on Geometric Design of Highways*. Design criteria shall include roadway classification, horizontal alignment, vertical alignment, and cross section



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design elements. The source (reference, page or figure/table number) of each design criteria element shall be documented in the design criteria table.

- 6.2 **Schematic Geometric Design** – The geometric design schematic shall comply with TxDOT schematic requirements (*Design Schematic Checklist*) and the *NTTA Design Standards*.
- 6.3 **Level E Cost Estimate** – The DSE shall develop a Level E cost estimate – current dollars/year and escalated to mid-term of construction – in accordance with *PC-02 Cost Estimate procedure* and based on dates provided by the NTTA. The estimate shall include ROW and utility relocation costs in accordance with the *NTTA Cost Estimating Template* and shall be submitted with the design schematic submittal.
- 6.4 **Cross Sections** – The DSE shall prepare “working” cross sections at approximately 100-foot intervals to confirm proposed ROW, where necessary, and to detail preliminary earthwork.
- 6.5 **Construction Staging Schematic** – The DSE shall develop a simple sequence of construction schematic and method of handling traffic during each phase of the design schematic using colorization for traffic and construction areas.
- 6.6 **Preliminary Signing Schematic** – The DSE shall prepare a preliminary signing schematic for the entire project in accordance with *AASHTO A Policy on Geometric Design of Highways* and/or the *Texas MUTCD*.
- 6.7 **Design Exception Questionnaire** – In the event the geometric design requires design exceptions, a design exception questionnaire in a similar format to TxDOT *Design Exception Questionnaire* shall be prepared.
- 6.8 **Hydraulic Analysis/Preliminary Drainage Design** – A preliminary hydraulic modeling/analysis shall be performed within the approved study area. This analysis shall be conducted utilizing USGS topographic maps and available contour data, determine preliminary drainage areas, 50-year and 100-year discharges using rational or regression methods, as well as size of preliminary cross drainage structures to verify roadway profile. Preliminary drainage design shall be in accordance with TxDOTs *Hydraulic Design Manual*. It is important to note that if affected, local municipalities have more stringent design standards and therefore, NTTA requires the adoption of more stringent standards. This task is necessary for proper vertical design of applicable and anticipated bridges and hydraulic structures.
- 6.9 **Structure Layout/Design** – A preliminary structure layout shall be provided within the approved study area. This layout shall establish all structure locations within the project limits.
- 6.10 **Submittal of Geometric Schematic for Review and Approval** – Once complete, the DSE shall submit to CM/Project Manager, the geometric schematic design and appropriate checklists which will be distributed to PMO design staff for review and comment in accordance with *SD-04, Schematic Review Process*.



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| Title: Schematic Geometric Design |                                 |             |

**7.0 REGULATORY REQUIREMENTS:**

N/A

**8.0 RELATED BOARD POLICY:**

N/A

**9.0 COMPONENT DOCUMENTS:**

- [SD-03-A1](#) *TxDOT Design Schematic Checklist*

**10.0 FLOWCHART:**

N/A

**11.0 REVISION HISTORY:**

| Revision | Revised by:    | Date Issued | DRN                   | Reason for Revision   |
|----------|----------------|-------------|-----------------------|---|
| 0        | Dave Clarke    | 06/05/2008  |                       | Original Issue  |
| 1        | Darla Payberah | TBD         | <a href="#">10288</a> | Removed "Guiding Principle". Updated 3.0 Scope/Applicability and 6.0 Procedures |

**DOCUMENT RELEASE NOTICE - CLOSEOUT CHECKLIST**

DRN Number 10288

**To be completed BEFORE the DRN is released**

|  | YES                                 | NO                       | N/A                                 |
|--|-------------------------------------|--------------------------|-------------------------------------|
| Latest revision of QM-12-F1 form used and submitted by the originator                  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Soft copy of the new/revised documents has been submitted with QM-12-F1                | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Soft copy inclusive of embedded files (pictures, visio flowcharts) has been submitted. | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| All required information have been provided in QM-12-F1                                | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Proper document type has been selected in Document Type box of QM-12-F1                | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Relevant type(s) of change have been marked in Type of Change box of QM-12-F1          | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Process owner/originator submitted training record where change is classified as major | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| A DRN number is assigned   | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| New/revised document was created/changed using current QM-12-F2 format                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Compared the word documents with source files to create redline as applicable          | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| All spelling has been checked and found correct  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Latest NTTA logo is available in the document if applicable                            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Originator and all review team members have approved and signed QM-12-F1               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| All requested changes have been incorporated in the source file                        | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| All Forms/Attachments have been referenced in the parent procedure                     | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| All Forms/Attachments/Procedures have been referenced in all other documents           | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| All external website hyperlinks are correct  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| All the internal QMS links are correct and working fine                                | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| All Forms/Attachments/Procedures have been linked to their associated documents        | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| New Forms/Records have been added to the Record Matrix                                 | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            |

|            |                     |                    |
|------------|---------------------|--------------------|
|            | <b>Prepared by:</b> | <b>Checked by:</b> |
| Date:      | <u>05/17/2011</u>   |                    |
| Name:      |                     |                    |
| Signature: |                     |                    |

**To be completed AFTER the DRN is released**

|   |                                     |                          |                          |
|---|-------------------------------------|--------------------------|--------------------------|
| Revised/New document is available in updated online version of QMS Manual | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| All links in the new/revised documents are working fine                   | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| All flowcharts in the document are visible/readable                       | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| An e-mail notification has been sent to the distribution list             | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Scanned e-mail notification and inserted into DRN number                  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Updated DRN tracking log with release information                         | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Moved DRN working folder to Archive folder                                | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Filed hard copy of the DRN package  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Spreadsheet for Controlled Document Numbers has been updated              | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Spreadsheet for Document Linking updated as applicable                    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

|                     |                   |                      |                      |
|---------------------|-------------------|----------------------|----------------------|
| <b>Verified By:</b> | Date:             | Name:                | Signature:           |
|                     | <u>05/17/2011</u> | <u>MD OMAR FARUK</u> | <u>MD Omar Faruk</u> |