DRAINAGE PLANS REVIEW

Revised: June 13, 2003

*Remember to check Plans Prep Manual – Volume I, Chapter 13 and 14 (Initial and Final Engineering Design Process), and Chapter 25 (Design Criteria for 3R); Volume II, Chapters 5 (Drainage Map), Chapter 8 (Drainage Summary and Optional Materials), Chapter 14 (Drainage Structures), Chapter 15 (Lateral Ditch/Outfalls/Ponds) for more detailed information
**Drainage Engineer assigned to project will retain files in their office throughout the review process, and during construction until final acceptance

SCOPE DEVELOPMENT PROCESS

A. Determine what information we have in our files for the project with regards to the existing Drainage (i.e. report, maps, etc.), and Permitting. Once we know what we have, then we can determine what we need. A drainage map and calculations should be available in our files, or included in the scope if needed.
B. Research any flooding information within the general project limits from inquiry files, and direct the Consultant to the maintenance staff and local governments for verification and additional information. Always remember that limits can be extended if we need to cover a drainage problem.
C. If drainage system is to remain, then complete field review to determine if video assessment should be completed. Coordinate with maintenance on this need. If we determine video work is needed, then include in Consultant scope. However, if determination is not certain, then include it in the scope as an optional service. All in-house needs for Design and Maintenance will be covered by the Drainage Video contract.
D. Participate in staff hour negotiation based on scope determination for drainage and permitting.

INITIAL ENGINEERING REVIEW (PPM, Vol. I – Chapter 13)

I. Items for submittal:

A. Construction plans including drainage map, typical sections, plan and profile views, and cross sections (Note for 3R jobs, may be just the report)
B. Drainage Documentation to include one of the following: (1) Pond Sitting Report (New Construction or Widening with r/w), (2) Conceptual Drainage Design Report (other projects typically not requiring extensive r/w, which may include 3R, that include extensive drainage work, modifications or upgrades), or (3) a 3R Report for only minor drainage work.
C. Approved Permit Involvement Form
D. Preliminary BHR (if applicable)
E. Verification that the Drainage/Permit Coordination Meeting has occurred, or is scheduled to occur within the next few weeks.

II. Review Items:

A. Construction Plans

1. Drainage Map

a. Pertinent existing structures & pipes with relevant information
b. Existing and proposed outfall locations
c. Design high water information as required
d. Off-site areas delineated (verify with cross sections & field review if necessary)
e. Legible scales
f. Plan & profile shown as per PPM Chapter 5, some exceptions allowed

2. **Plan & Profile Views**
   a. Proposed profile should have high points at major intersections and side streets (i.e. low points should be pulled away from these areas to reduce flow off R/W)
   b. If drainage features to remain, check profile to ensure consistency with existing structures (i.e. low points maintained at sag inlets, etc.)
   c. All existing drainage features and known utilities shown – more utility work will be done
   d. Check minimum grades and minimize use of sag vertical curves
3. **Cross Sections**
   a. Proposed back of sidewalk elevation does not block off-site contributing areas; possible solutions to recommend include special back of sidewalk profile, back of sidewalk inlet or yard drain with appropriate R/W

B. Drainage Documentation (Minimum requirements for 3R are in italics)

1. *Description of existing system including location of all outfalls*
2. *Hydraulic evaluation of existing system to include: (1) Notations from visual inspection of system (i.e. cracked grates, silted-up structures/pipes, pavement failures at structures, collapsed outfalls, etc.); (2) Proof of flooding checks with FDOT Maintenance, FDOT Drainage and local government; (3) If video required (this should be included in scope), then a review of recommendations from Consultant.*
3. *Proposed improvements with conceptual design description*
4. Discussion on issues relative to the final design including SHGWT, Off-site inflows, floodplain, critical permit criteria (i.e. limited discharge basin, additional water quality treatment, etc.), existing permits, well field encroachment, contamination, etc.
   NOTE: We're trying to ensure all potential fatal flaws have been identified for project.
   **For Pond Siting Reports – Need to review calculations for sufficient justification for r/w takings as required.

C. Approved Permit Involvement Form

1. All areas filled out properly
2. Required permits identified
3. Check and verify that schedules reflect permit need for project

D. Preliminary BHR

1. Need information on minimum vertical and horizontal bridge clearances, unique requirements regarding the bridge site shall be noted, and initial scour values.
2. If controlled canal, then check to ensure that a documented response from controlling agency on vertical and horizontal requirements for the structure has been provided. Also, any special requirements for dredging or protection of the waterbody should be specified.
3. Ensure deck drainage is considered in design of long bridges where spread exceeds the shoulder width; look into use of scuppers when permittable

III. Closing Remarks:

A. Clear communication to Consultant on permits required, or if No Noticed General Permit, then request for appropriate documentation as required. VERIFY SCHEDULE TIME IS SUFFICIENT!

B. If permits required, then clarify the needs for the Interim-permit submittal review including the construction plans, permit drawings, and draft drainage report with all relevant design and permit information (i.e. water quality and quantity calculations), storm tabulations, spread analysis, corrosion analysis, soil survey, optional pipe material assessment and MOT drainage

INTERM - PERMIT SUBMITTAL REVIEW

I. Items for submittal:

A. Construction plans including drainage map, typical sections, plan & profile views, drainage structure sheets, any special drainage details (i.e. outfalls/ditches/ponds), optional materials sheet, and cross sections

B. Draft Drainage Report with all relevant design and permit information (i.e. water quality and quantity calculations), storm tabulations, spread analysis, corrosion analysis, and optional pipe material assessment. Also, the report needs to address MOT drainage issues.

C. Permit Sketches (see Permit manual for review checklist)

II. Review Items:

*Review responses to Initial Engineering phase comments, and ensure all issues addressed

A. Construction Plans

1. Drainage Map

a. All previous items under Initial Engineering
b. Proposed drainage divides, areas and flow direction arrows
c. Proposed structures with structure numbers (legible)
d. Proposed storm sewer pipes
e. Retention/detention ponds with applicable stage data for 3 year and permit storm
f. Cross drains with pipe sizes and structure numbers
g. Flood data (if applicable) for cross drains
h. Quick check of areas against final storm tabulations in Drainage Report
I. If map is to be used in final construction plans, then make sure note regarding not to be used for construction purposes has been included (see PPM for wording)

2. Plan & Profile Views

a. All previous items under Initial Engineering
b. Inlet spacing consistent with spread calculations; drainage report should include spread calculations for typical section; not necessary at every inlet
c. Inlet spacing on super elevated, steep or excessively flat grades; drainage report should include spread calculations for these critical areas
d. Inlet locations logical (additional inlets may be needed at created low points in turn lanes & upstream of side streets to avoid flow off R/W)
e. Inlets located our of curb return as per Index #303
f. Collection of runoff from side streets which flow to R/W
g. Directional change in flow does not exceed 90 degrees from incoming and outgoing pipe at structures
h. Pipe lengths do not exceed maintenance access needs as per Drainage Manual
i. All proposed pipes to be minimum 450 mm (18")
j. Angular conflicts of multiple pipes entering structure as per Stormdrain Handbook
k. All existing drainage features not proposed for utilization in the new system should be totally removed; plugging with flowable fill is acceptable in areas with critical MOT issues and utility concerns; check for relevant general note (i.e. existing drainage structures within construction limits shall be removed, unless otherwise noted)

3. Drainage Structure Sheets

a. Logical layout of structures with correct to and from inlet notations, and arrows
b. Sumps included upstream of all French drainpipes and outfalls to ponds, and also at critical junctures with a high potential for clogging/siltation *no weep hole if below water table
c. Pipe clearance below base

3. **Drainage Structure Sheets (Continued)**
   d. Minimum pipe slope 0.1% (check against storm tabulations), exception for French drains
   e. Pipe not unnecessarily deep to avoid costly excavation
   f. Clearances at utility conflicts
   g. Box size is appropriate for incoming pipes as per the Storm Drain Handbook; good practice to use a J-bottom box if three or more pipes are coming into structure
   h. Must specify size of j-box on sheet
4. **Special Drainage Details (may be included in Drainage Structure Sheets)**
   a. For control structures with weirs include two manholes for access from either side, and check clearance between weir and bottom of top slab for a minimum of 6 inches
   b. Clearances under skimmers in consideration of siltation
   c. Weir, grate and bleeder elevations consistent with drainage report
   d. Pond area, slope, etc. consistent with drainage report
   e. Dry swales should be 450 mm (18") above SHGWT as noted in report, and scarification note should be included to recover percolation following construction
5. **Optional Materials Tabulation Sheet**
   a. Consistent with corrosion analysis in drainage report
   b. Pipes are available in index
   c. Exempted structures are listed and consistent with plans
   d. Manning's N value is considered in materials listed versus design
6. **Cross Sections**
   a. All previous items under Phase I
   b. Check that all off-site structures proposed have appropriate R/W

B. Drainage & Permit Related Criteria in Drainage Report

1. Design criteria consistent with FDOT Drainage Manual
2. permit criteria consistent with SFWMD/SJRWMD and local regulations (special consideration for limited discharge areas, ponds adjacent to wetlands, additional impervious treatment, environmentally sensitive areas, etc.)
3. logical explanation of SHGWT and tail waters utilized
4. floodplain evaluation in critical areas
5. percolation tests included for projects with French drain and/or retention
6. water quality calculations follow provided rules and equations
7. logical explanation of pre vs. post-development basins and characteristics
8. routing input correct and consistent with plan information (i.e. control structure elevations, weir openings, etc.)
9. input and results from flood routing (i.e. ADICPR) included
10. Project exceeds water quality and quantity requirements; otherwise, schedule meeting with Consultant to develop alternatives
11. Storm Tabulations in Drainage Report

   a. Pipe velocities exceed minimum velocity of 0.76 mps (2.5 fps); will accept 0.60 mps (2.0 fps) for critical areas; note that 450 mm laterals will not normally meet this requirement
   b. Minimum clearance of 0.3 m (1.0 ft) maintained between inlet elevation and HGL excluding minor losses; or when minor losses included the HGL may be increased up to the inlet elevation
   c. Weirs constructed on mainline trunk system must be included in analysis
   d. Tail water modeled should be for the immediate receiving water downstream for the 3 year, 1 day event; if this is a proposed pond/swale/French drain, then the flood routing should be computed for this smaller event to predict this stage

B. Drainage & Permit Related Criteria in Drainage Report (Continued)

12. Spread analysis in Drainage Report
    a. Spread computed for typical section; verify with spot checks for inlet spacing on plans
    b. Spread computed for sensitive areas like super elevated sections, steep grades, and very flat profile and/or cross slopes; verify with spacing shown in plans
13. Corrosion Analysis and Optional Pipe recommendation in Drainage Report
    a. Output from FDOT Culvert Service Life Estimator program included with input consistent with soils lab report also included in Report
    b. Optional materials recommendation consistent with design service life required for project; verify with optional materials tabulation sheet in plans
14. MOT drainage issues discussed and detailed in plans if necessary
15. If new bridge or culvert extension/replacement is included, then may need BHR and supporting calculations to show head loses meet permit criteria

III. Closing Remarks:

a. If major comments (i.e. unable to meet permit requirements, roadway flooding due to high tail water, etc), then request scheduling of additional meeting
b. Request Copies of final permit package, application letter and all future responses.
c. Require notification from Project Manager of all meetings with permitting agencies.

FINAL ENGINEERING REVIEW

I. Items for submittal:

A. Construction plans including drainage map, typical sections, plan & profile views, drainage s structure sheets, any special drainage details (i.e. outfalls/ditches/ponds), optional materials sheet, and cross sections

B. Drainage Report with any revisions since the permit submittal including all relevant design and permit information (i.e. water quality and quantity calculations), storm tabulations, spread analysis, corrosion analysis, and optional pipe material assessment.

C. Final BHR (if applicable)

II. Review Items:

A. Construction Plans

1. Review responses to last comments, and ensure all issues addressed
2. Complete any previous review items, which were not done due to missing information

B. Drainage Report

1. Review responses to last comments, and ensure all issues addressed
2. Complete any previous review items, which were not done due to missing information

C. Final BHR review (refer to controlled canal outline and Cross Drain handbook)

1. Bridge analyzed matches structure in plans
2. All information provided on BHRS is consistent with report, especially the scour numbers

III. Closing Remarks:

A. For final acceptance of project prior to the Production Date, the Drainage Department will require the following items from Consultant:
    1. Final signed and sealed Drainage Map

III. Closing Remarks: (Continued)

2. Final signed and sealed copy of the Drainage Report including all relevant design and permit information (i.e. water quality and quantity calculations), storm tabulations, spread analysis, corrosion analysis, optional pipe material assessment and MOT Drainage. This report should also be provided in pdf format as per all the new Consultant Contracts.
3. Final signed and sealed copy of the BHR and BHRS
4. Microstation files for the Drainage Map and other special Drainage Details (i.e. outfall/control structures, retention/detention ponds, nonstandard inlets, etc.)
5. Copies of any JPA's, Letters of Agreement and/or easements necessary for the continued functioning of the drainage system

FINAL ACCEPTANCE

If all required items submitted for project, then reply via email that the Drainage Department has approved the project as per sign-off on the schedule. The drainage reviewer should organize the project folder and keep it in their files until Construction complete. Upon final acceptance from Construction, the reviewer should then condense the file to retain only the pertinent Drainage and Permit information. The file should then be stored in the Drainage Library.