Preliminary Drainage Design Submittal Deliverables

Section 1 – Project Drainage Summary **(PDF in black)**
- Summary Sheet of Designed Structures with flow changes at outfalls
- Project Drainage Discussion
  - *Site conditions*
  - *Design assumptions*
  - *Analysis methods*
  - *Programs used*
  - *Deviations from Drainage Manual guidance*
- Project Electronic Source Data **(source data only in blue):**
  - **.dgn manuscipt file of project*
  - **.alg file*
  - **.dtm file – existing and merged proposed*
  - **.KMZ File of Alignment*
  - *Hydrology - NOAA Intensities Table*
  - *Watershed maps (pipes, storm sewers, & ditches) with:*
    - *Longest flow path, C value calculations, existing areas if different*

Section 2 – Culverts & Bridges
- Standard Analysis:
  - *Electronic source data containing:*
    - *Pipe Sheets or Situation Survey Sheets with:*
      - *Hydraulic Data Table: Design & Check Q, HW, Outlet Velocities, Basis for Allowable HW, & Drainage Area*
    - *Outfall Channel Geometry*
    - *Hydrologic and Hydraulic program files*
- Advanced Analysis:
  - *Electronic source data containing:*
    - *Structure Plan or Layout Sheet*
    - *Hydrologic and Hydraulic program files:*
    - *Maps (FIRM, contours, aerial, drainage area, land use, photos, etc. as needed – (can be within HEC RAS.)*
    - *Risk Assessment Form (if applicable)*
    - *Output Results*
    - *Site Specific Hydrologic and Hydraulic Discussion*
      - *FEMA restrictions & conclusions*
      - *Any environmental commitments or limitations*

Section 3 – Storm Sewer Systems
- *Electronic source data containing:*
  - *Hydrologic and Hydraulic program files*
  - *Output of results, Plot of EGL/HGL profile as needed*

Section 4 – Pavement Inlet Spread Calculations
- *Electronic source data containing:*
  - *Hydrologic and Hydraulic program files*
  - *Output of results*

Section 5 – Roadside Ditch Calculations
- *Electronic source data containing:*
  - *Hydrologic and Hydraulic program files*
  - *Output of results*

Final Drainage Design Submittal Deliverables

Section 1 – Project Drainage Summary **(PDF in black)**
- Summary Sheet of Designed Structures with flow changes at outfalls
- Project Drainage Discussion
  - *Site conditions*
  - *Design assumptions*
  - *Analysis methods*
  - *Programs used*
  - *Deviations from Drainage Manual guidance*
  - *Pertinent Email Correspondence*
- Hydrology - NOAA Intensities Table
- Watershed maps (pipes & storm sewers) with:
- *Longest flow path, C value calculations, existing areas if different*
- Project Electronic Source Data **(source data only blue**):
  - **.dgn manuscipt file of project*
  - **.alg file*
  - **.dtm file – existing and merged proposed*
  - **.KMZ File of Alignment*
  - *Hydrology - NOAA Intensities Table*

Section 2 – Culverts & Bridges
- Standard Analyses
  - Pipe Sheets or Situation Survey Sheets with:
    - *Hydraulic Data Table: Design & Check Q, HW, Outlet Velocities, Basis for Allowable HW, & Drainage Area*
    - *Outfall Channel Geometry*
  - Hydraulic Design Output Report
  - Electronic source data containing:
    - *Hydrologic and Hydraulic program files*

- Advanced Analyses
  - Structure Plan or Layout Sheet
  - Maps (FIRM, contours, aerial, drainage area, land use, photos, etc. as needed.)
  - Risk Assessment Form (*if applicable*)
  - Site Specific Hydrologic and Hydraulic Discussion
    - *FEMA restrictions & conclusions*
    - *Any environmental commitments or limitations*
  - Hydraulic Design Output
  - Electronic source data containing:
    - *Hydrologic and Hydraulic program files*
    - *Electronic files of Maps (if not within HEC RAS)*

Section 3 – Storm Sewer Systems
- Hydraulic Design Output
  - *Output of results, Plot of EGL/HGL profile as needed*
- Electronic source data containing:
  - *Hydrologic and Hydraulic program files*

Section 4 – Pavement Inlet Spread Calculations
- Hydraulic Design Output
- Electronic source data containing:
  - *Hydrologic and Hydraulic program files*

Section 5 – Roadside Ditch Calculations
- Hydraulic Design Output
- Electronic source data containing:
  - *Hydrologic and Hydraulic program file*

Examples:

Section 1 - Summary Sheet

Station	Structure	Existing Outfall Discharge (cfs)	Proposed Outfall Discharge (cfs)
100+00	36" Culvert	26.5	no change
200+00	60" Storm Sewer Outfall	110	125 CFS
300+00	8 x 6 RCBC	209	no change

Section 2 - Hydraulic Data Table (Pipe Sheet)

FLOOD EVALUATION DATA DRAINAGE AREA = XXX.X ACRES				
	RETURN INTERVAL (YR)	RUNOFF (CFS)	HEADWATER ELEVATION (FT)	OUTLET VELOCITY (FPS)
DESIGN	25	--	--	--
CHECK	100	--	--	--
ALLOWABLE HEADWATER (FT) = --				
BASIS FOR AHW	*DESIGNER DESCRIBES ESTABLISHMENT OF ALLOWABLE HEADWATER ELEVATION* EX: LOW SHOULDER ELEVATION = XXX.XX FT			