APPENDIX D

DRAINAGE REPORT CONTENTS AND PROJECTS PROCESS CHECKLIST (Checked items imply data can be found in report under specified outline number, different or additional locations are indicated).

DRAINAGE REPORT CONTENTS AND PROJECT PROGRESS CHECKLIST						
Report Contents	**Project Progress Checklist**					
	Conceptual	**Alternative**	**Preliminary**	**Intermediate**	**QA/Specs**	**Advertise**
Title Page			✓			
Project Name, Project ID Number, Type of Study, Study Date, Preparer's Name, Company Name			✓			
Table of Contents						
Executive Summary						
I. Introduction & Purpose	**30**	**60**	**90**	**100**	**100**	**100**
a. Project location & description			Figure 1			
b. Overall project scope summary						
c. Drainage design scope summary						
d. Drainage design team (name, title, responsibility)						
II. Design Procedures and Criteria	**30**	**60**	**90**	**100**	**100**	**100**
a. Drainage criteria - Summarize design criteria			✓			
i. Hydrologic procedures and criteria (provide explanation for methods used)			✓			
ii. Hydraulic procedures and criteria (provide explanation for methods used)			✓			
iii. Design assumptions and issues (special design issues that influenced design, i.e., geotechnical, environmental, utilities, right-of-way, etc.)						
b. Agency Regulations - Federal, State and Local Regulations (summarize applicable regulations including but not limited to the following:)			✓			
i. Drainage Manual Section 1.3 – Legal Aspects			✓			
ii. Code of Federal Regulations Title 23 Part 650 subparts A & B			✓			
iii. Federal Emergency Management Agency (National Flood Insurance Program) requirements			✓			
iv. Regulatory agency requirements (NDEP, Corps of Engineers, Fish and Wildlife, etc.)			✓			
v. Regional flood control requirements			✓			
c. Compliance - Statement of compliance with NDOT drainage policies and criteria, and all applicable federal, state, and local regulations. List of any approved design and regulatory exceptions.						

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III. Existing Conditions	**30**	**90**	**100**	**100**	**100**	**100**
a. Existing conditions - general description of the contributing watersheds and sub-basins, and offsite and onsite drainage facilities			✓			
i. List and provide a brief discussion of previous reports in the project vicinity. Confirm applicability of information used. Copy appropriate information in Appendix F.			✓			
ii. Drainage basin characteristics (sub basins, areas, slopes, hydrologic condition, etc.)			✓			
iii. Established/historic design frequency and 100-year flow patterns, flow splits, diversions, etc.			✓			
iv. FEMA information including established and ongoing studies.			✓			
v. General discussion of existing facilities (flood control master plan elements, irrigation ditches, storm drain systems, water quality facilities, etc) including capacity, condition, maintenance problems, etc.			✓			
vi. General discussion of stability issues such as aggradation, degradation, erosion, scour, etc.						
vii. General discussion of existing environmental issues such as wetlands, impaired waters, fisheries, etc., and permanent water quality and erosion control facilities						
b. Figures & Summary Tables	**30**	**60**	**90**	**100**	**100**	**100**
i Existing facility summary table - including station, facility type (culvert, channel, inlet, etc,), size, material, capacity, condition (new, good, fair, poor), deficiency (corroded, failed, flaking, damaged, etc.), other issues (scour, erosion, etc.) potential repair strategy (replace, repair, etc.), comments			✓			
ii. Existing watershed summary table - including pertinent information such as basin number, area, curve number or Rational C, time of concentration, design frequency peak flow, 100-year flow			✓			

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iii. Existing watershed basin map showing contours, design and 100-year flow patterns, sub basins, nodes and flow direction, and existing facilities (storm drain facilities, channels, dikes, culverts, bridges, etc.), and the flow rates at each point of interest.			✓			
IV. Design Recommendations	**15**	**30**	**80**	**100**	**100**	**100**
a. General (discuss overall project approach and summarize benefits, accomplishments, etc.)			✓			
b. Design alternatives (discuss concepts, major features, pros and cons, opportunities, constraints, etc.)			✓			
i. Project and drainage cost estimates			✓			
ii. Effects to existing drainage patterns and conditions			✓			
iii. Regional flood control facilities			✓			
iv. Developer local drainage facilities			✓			
v. Temporary drainage facilities			✓			
vi. Roadway geometrics constraints			✓			
vii. Geotechnical (percolation rates, settlement, soil types, chemistry, etc.)			✓			
viii. Utility conflicts			✓			
ix. Constructability			✓			
x. Traffic control (detour, phasing, etc.)			✓			
xi. Environmental issues			✓			
xii. Water quality, erosion and sediment control (temporary & permanent)			✓			
xiii. Special maintenance needs (access, equipment, etc.)			✓			
xiv. Right-of-way impacts			✓			
xv. Structural issues			✓			
c. Proposed/Selected alternative (discuss major features)						
i. On-site facilities			✓			
ii. Off-site facilities			✓			
iii. Water quality, erosion control and sediment (temporary and permanent)			✓			
(1). Temporary Pollution Control Project Categorization Score Sheet			✓			
iv. Proprietary items			N/A			
v. Drainage cost estimates						

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vi. Right-of-way impacts			✓			
vii. Utility relocations			✓			
viii. Special provisions issues						
ix. Maintenance plan (refer to appendix or separate report)						
d. Figures & Summary Tables						
i. Proposed facility summary table - including station, facility type (culvert, channel, inlet, protection, etc.), size, material, capacity, velocity, comments.			✓			
ii. Proposed watershed flow summary table - including pertinent information such as basin number, area, curve number or Rational C, time of concentration, design frequency peak flow, 100-year flow, etc.			✓			
iii. Proposed watershed basin map showing revised sub-basins, design and 100-year flow patterns, nodes and flow direction, and proposed facilities (storm drain facilities, channels, dikes, culverts, bridges, etc.), and the flow rates at each point of interest.			✓			
iv. On-site drainage summary table including; basin number, basin discharge, upstream bypass flow, total flow, inlet number and type, station/offset, calculated spread, allowable spread, intercepted flow, bypass flow and receiving inlet number, etc.			✓			
v. On-site drainage basin map, superimposed on roadway plans, showing contour (if available), sub basins, nodes and flow direction, roadway low & high points, location of all drainage ditches, facilities, etc.			✓			
vi. FEMA floodplain map showing project limits			✓			
vii. Master plan and neighborhood plan flood control facilities map (if available), with pertinent facility information and the projects limits identified			N/A			
References	**30**	**90**	**100**	**100**		**100**
Appendix A* - Hydrologic Information and Computations	**30**	**60**	**90**	**100**		**100**
I. Backup hydrologic data and calculations including but not limited to:						
a. Soils map with hydrologic group information with project limits and watershed boundaries			✓			

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b. Land use information map with project limits and watershed boundaries						
c. Curve number/precipitation loss parameter			✓			
d. Precipitation data and calculations			✓			
e. Time of concentration calculations			✓			
f. Routing parameter calculations			✓			
g. HEC-1, Regression, Rational, Statistical, etc. (Input and summary output data listing for all computerized hydrologic calculations)			✓			
Appendix B* - Hydraulic Calculations – Off-site facilities	**30**	**60**	**90**	**100**	**100**	**100**
II. Backup hydraulic data and calculations including but not limited to:						
a. Sizing (bridges, culverts, etc.)			✓			
b. Documentation/discussion on starting water surface elevation			✓			
c. Scour / mitigation						
d. River training						
e. Transition structures						
f. Energy dissipators			✓			
g. Existing and proposed ponding elevations and limits						
h. Hydraulic work map showing cross-sections, water surface elevations, Manning's 'n' value, bank stations, right-of-way limits, etc.						
i. Channel sizing and lining/stability calculations with summary table showing stationing, proposed dimensions, flow rate, depth, velocities, super elevation etc.			✓			
j. Detention basins			N/A			
i. Basin relationships (stage-storage, stage-discharge)						
ii. Sediment calculations						
iii. Principal and emergency spillway calculations						
iv. Outfall						
k. Temporary facilities (during construction)						
l. Pipe material selection and strength calculations			✓			
m. HEC-RAS, HEC-2, WSPG, etc. (Input and summary output printout of computerized hydraulic calculations)			✓			

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Appendix C* – Hydraulic Calculations – On-site facilities	**10**	**30**	**60**	**100**	**100**	**100**
I. Backup hydraulic data & calculations including but not limited to:			✓			
a. Inlet interception, spread calculations, bypass, etc.			✓			
b. Storm drain calculations including hydraulic and energy grade lines						
c. Roadside ditch and median ditch sizing and stability calculations, with summary table showing stationing, proposed dimensions, flow rate, depth, velocities, etc.			✓			
d. Documentation on starting water surface elevation			✓			
e. Water quality facilities/sand-oil separators, sediment traps, etc.			N/A			
f. Target pollutants, TMDLs, pollutant load reduction, etc.			N/A			
g. Detention/infiltration basins			N/A			
i. Basin relationships (stage-storage, stage-discharge)			N/A			
ii. Sediment calculations			N/A			
iii. Principal and emergency spillway calculations			N/A			
iv. Infiltration rates			N/A			
v. Outfall			N/A			
h. Temporary facilities (during construction)			N/A			
i. Pipe material selection and strength calculations			N/A			
j. WSPG, MicroStation Storm and Sanitary, Hydrain, etc. (Input and summary output printout of computerized hydraulic calculations)			N/A			
Appendix D – Erosion control and calculations	**15**	**15**	**30**	**60**	**100**	**100**
I. Permanent Erosion and Sediment Control (Refer to NDOT Storm Water Quality Planning and Design Guide)			Appendix B			
a. Supporting calculations and related information for all facilities (Refer to Appendices A, B, and C above)			Appendix B			
II. Temporary Pollution Control (Refer to NDOT Storm Water Quality Planning and Design Guide)			N/A			
a. Supporting calculations and related information for all facilities (Refer to Appendices A, B, and C above)			N/A			
Appendix E- Cost Estimates	**30**	**60**	**90**	**100**	**100**	**100**
I. Supporting drainage cost estimate calculations, including summary table showing; bid item number, bid item description, quantity, cost per unit, total cost per item, etc.						

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Appendix F - Previous Reports / Historic Information						
I. Pertinent excerpts/copies from referenced reports						
II. Historic information (Maintenance reports, news articles, observations)						
Appendix G – Photo Log						
I. Aerial photographs						
II. Pre-project photographs						
Appendix H - QA/QC Items						
I. Design exceptions						
II. Review comments and responses (Form 1)						
III. Updated Report Content, Progress Report and QA/QC Check List						
IV. Updated Documentation Check List						
Coordination Checklist						
I. Coordination with disciplines and agencies						

Project Name: USA Parkway
Project No./EA:
Principal Engineer:
Consultant: Wood Rodgers, Inc.

Date: April, 2013
Submittal Level: Preliminary Design
Hyd. Engineer:
Agreement No.:

NOTE: Appendices A, B, and C – *Provide information in electronic format in lieu of hard copy where possible (check with PHE).