

CHECKLIST FOR DRAINAGE STUDY AND HYDRAULIC DESIGN

THIS PAGE SHOULD BE COMPLETED AND APPROVED PRIOR TO FIELD RECONNAISSANCE VISIT

APPROVED BY: _____ **DATE :** _____

I.D.: _____ **COUNTY:** _____ **PROJECT ENGINEER:** _____ **DATE:** _____

1. REVIEW PLANNING REPORT AND NATURAL RESOURCES TECHNICAL REPORT (NRTR). IDENTIFY COMMITMENTS OR REQUIREMENTS WHICH WOULD AFFECT THE DESIGN.

2. IDENTIFY PRIOR SURVEYS AT STREAM CROSSINGS, INCLUDING UPSTREAM AND DOWNSTREAM STRUCTURES. INCLUDE STRUCTURE NUMBER, SIZE, AND LOCATION.

3. IDENTIFY FLOOD ZONE STATUS.

4. IDENTIFY STREAM GAGES IN AREA. (DATES AND FREQUENCIES OF MAJOR FLOODS)

5. LIST DRAINAGE AREA(S) AND SOURCE(S).

6. PROVIDE DESCRIPTION OF EXISTING STRUCTURES.

7. DEVELOP PRELIMINARY DESIGN DISCHARGES.

8. ESTIMATE PROPOSED STRUCTURE TYPE(S) AND SIZE(S).

9. DETERMINE POSSIBLE PERMIT REQUIREMENTS.

10. REVIEW AVAILABLE SURVEY DATA.

11. IDENTIFY ANY HYDROLOGIC / HYDRAULIC STUDIES WITHIN THE PROJECT AREA BY AGENCIES SUCH AS: THE CORPS OF ENGINEERS, TVA, NRCS, CITIES OR COUNTIES.

FIELD INVESTIGATIONS

THE FOLLOWING INFORMATION IS TO BE INCLUDED IN THE FIELD SURVEY NOTES:
(CHECK LOCATION AND SURVEY NOTES AND SUPPLEMENT WITH ANY ADDITIONAL
INFORMATION THAT MAY BE REQUIRED) ANSWER YES, NO, N/A, OR COMMENT AS APPLICABLE

1. TOPO IS TO INCLUDE BUT NOT LIMITED TO:

- a. _____ CHANNEL BANKS AND WATERS EDGES
- b. _____ EXISTING STRUCTURES (BRIDGES, CULVERTS, AND STORM DRAINAGE SYSTEMS)
- c. _____ UTILITIES (POWER, WATER, GAS, TELEPHONE, SANITARY SEWER, ETC.)
- d. _____ ROADWAY PAVEMENT, SHOULDERS AND TOE OF FILL
- e. _____ ANY DEVELOPMENT ADJACENT TO SITE, UPSTREAM AND DOWNSTREAM
- f. _____ LIMITS OF FLOODPLAIN
- g. _____ DRAINAGE COURSES AND DRAINAGE DITCHES

2. LEVELS

- a. _____ CENTERLINE PROFILES OF NATURAL GROUND AND EXISTING HIGHWAY (WHERE APPLICABLE) ACROSS FLOODPLAIN
- b. _____ SECTION UNDER BRIDGE
- c. _____ SIZE, DEPTHS, AND INVERTS OF ALL CULVERTS AND STORM DRAINAGE SYSTEMS
- d. _____ STREAM BED, NATURAL GROUND, AND WATER SURFACE PROFILE ELEVATIONS (NORMAL, AT DATE OF SURVEY, AND ORDINARY HIGH WATER) UPSTREAM AND DOWNSTREAM FOR A SUFFICIENT DISTANCE BEYOND LIMITS OF CONSTRUCTION. (EXTEND OUTLET DITCH PROFILES AS FAR AS NECESSARY TO REACH ADEQUATE CAPACITY).
- e. _____ FLOODPLAIN CROSS-SECTIONS AS DEEMED NECESSARY FOR PERFORMING BACKWATER ANALYSIS
- f. _____ ELEVATION OF ANY UPSTREAM OR DOWNSTREAM DEVELOPMENT THAT WOULD BE CONSIDERED IN DESIGN (EXAMPLE: FINISHED FLOOR ELEVATION AND LOWEST ADJACENT GRADE OF HOUSES, BASEMENTS, YARDS, GARDENS, BARNs, AND PONDS)
- g. _____ ELEVATION OF ANY DEBRIS OR OTHER HIGH WATER MARKS

3. SCOUR POTENTIAL: OBTAIN THE FOLLOWING FIELD INFORMATION IN ADDITION TO THE NORMAL BRIDGE CROSSING DATA

- a. _____ WHAT IS THE STREAM BED AND FLOODPLAIN MATERIAL? IF SAND, IS IT FINE ,MEDIUM, OR COARSE?
- b. _____ ARE THE STREAM BANKS STABLE? ARE THERE VISIBLE SLUMPS, VERTICAL BANKS, LEANING TREES, OR UNDERCUT BANKS?

AT EXISTING CROSSING SITES:

- c. _____ OBTAIN A TYPICAL CHANNEL SECTION AT SUFFICIENT DISTANCE UP OR DOWNSTREAM BEYOND CROSSING EFFECTS
- d. _____ OBTAIN BED PROFILE EXTENDING WELL BEYOND SCOUR AREA
- e. _____ IDENTIFY THE TYPE FOUNDATION OF THE EXISTING STRUCTURE
IF FOOTING IS VISIBLE, NOTE CONDITION
- f. _____ OBSERVE GROUND CONDITIONS AROUND EXISTING PIERS AND ABUTMENTS IS THERE INDICATION OF PREVIOUS SCOUR? IF SO, NOTE APPROXIMATE DEPTH.

4. RECONNAISSANCE

- a. _____ DRIFT POTENTIAL, SIZE, AND QUANTITY. (QUESTION SOURCES WHEN HIGH-WATER INFORMATION IS OBTAINED).
- b. _____ IDENTIFY CULTURE IN FLOODPLAIN FOR DETERMINATION OF FLOW RESISTANCE AND DISTRIBUTION (ESTIMATE "N" VALUES)
- c. _____ IDENTIFY DEVELOPMENT IN FLOODPLAIN THAT COULD BE AFFECTED BY BACKWATER, DOWNSTREAM EROSION OR REDUCTION OF FLOW
- d. _____ IDENTIFY STORAGE AREAS SUCH AS PONDS, LAKES, ETC., FOR POSSIBLE ADJUSTMENT OF DISCHARGE RATES WHERE APPLICABLE
- e. _____ REVIEW ADEQUACY OF DOWNSTREAM CHANNELS FOR CONVEYANCE OF INCREASED DISCHARGE RATES
- f. _____ PHOTOGRAPHS OF SITE(S)
- g. _____ IDENTIFY POTENTIAL WETLAND / JURISDICTIONAL STREAMS

5. OBTAIN HISTORICAL H.W. INFORMATION SOURCES: (NAMES, ADDRESSES, AND PERIOD OF KNOWLEDGE OF PROVIDER).

- a. _____ LOCAL RESIDENTS
- b. _____ BRIDGE MAINTENANCE PERSONNEL
- c. _____ ROADWAY MAINTENANCE PERSONNEL
- d. _____ FREQUENT ROAD USERS (EX. MAILMAN, DELIVERY PEOPLE)

QUESTIONS:

- a. _____ MAXIMUM H.W. WHEN IT OCCURRED?, WHAT DAMAGE OCCURRED?,
- b. _____ OTHER LESSER FLOOD LEVELS, HOW OFTEN?
- c. _____ YEARLY OCCURRENCE

6. DATA ON UPSTREAM AND DOWNSTREAM CROSSINGS

- a. _____ SIZE
- b. _____ RELATIVE LEVELS OF STRUCTURE AND ROADWAY
- c. _____ EXISTING ISSUES (DEBRIS, SCOUR, ETC.)

HYDRAULIC STUDY

THE FOLLOWING INFORMATION IS TO BE COMPLETED BY THE DESIGN ENGINEER AT THE COMPLETION OF THE PROJECT DESIGN.

1. WHAT DESIGN FREQUENCIES WERE USED FOR DRAINAGE STRUCTURES? WHY?

2. WHAT ALTERNATES HAVE BEEN CONSIDERED FOR THE MAJOR DRAINAGE STRUCTURES?

3. HAS AN ECONOMIC ANALYSIS BEEN MADE FOR ANY CROSSING DESIGN?
HAS A LESSER DESIGN STANDARD BEEN CONSIDERED?

4. HAS PROPOSED STRUCTURE OR DESIGN BEEN CHANGED FROM WHAT WAS
RECOMMENDED IN PLANNING DOCUMENT? IF SO, HAS PDEA BEEN NOTIFIED OF
CHANGES?

5. HAVE PROVISIONS BEEN MADE FOR UTILITY CONFLICTS?

6. HAVE EVALUATIONS BEEN MADE OF OUTLET CHANNELS FOR POTENTIAL EFFECT OF
PROJECT DEVELOPMENT?