

# STORM WATER DRAINAGE AND DETENTION CHECKLIST

Y N N/A

## IV. HYDROLOGY

### A. Rainfall

- Designed for 25-year, 24-hour duration as defined by TP40 (Exhibit 3)
- Discharge limited to 10-year, 24-hour pre-development unless downstream improvements are made as to not cause adverse impacts (Exhibit 4)

### B. Hydrologic Data: Preliminary Plan

- Vicinity Map
- Topographic Map
- Aerial photographs
- Stream flow records
- Historical high water elevations
- FEMA 100 year flood elevation
- Soil types
- Land use
- Slope
- Surface infiltration
- Storage

### C. Coordination: Maximum stage elevation furnished or approved by Terrebonne Parish Engineering Division

### D. Runoff Computation, Hydrograph Development and Modeling:

- 1. Rational Method
  - Drainage area no greater than 150 acres
  - c value taken from Exhibit 5
  - DOTD HYDR6020 and HYDR6000 used for storm drain and inlet spacing
- 2. Soil Conservation Service (SCS) Method (NRCS) (TR-55)
  - Curve Number (CN) taken from Exhibit 5
  - Type III, 24-hour rainfall distribution
  - Shape factor 256
- 3. Unit Hydrograph Method (HEC-1, SWMM, TR-20)

### E. Flood Routing:

- 1. Stream Flow Routing
- 2. Reservoir Routing

### F. Land Use

- G. Datum: Elevation referenced to the latest Parish adopted Vertical Datum

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H. Gage Reading (Historic Data) at major drainage artery

## V. HYDRAULIC DESIGN

### A. Storm Design Requirements:

#### 1. Existing site plan:

Minimum scale 1"=100'

Drainage features

1 foot contours

Utilities

Roads

Structures

Impervious areas

Flood encroachment areas

#### 2. Proposed site plan:

Minimum scale 1"=100'

Streets

Utilities

Drainage features

Lot lines

Lot grading

Discharge canals

Location of major drainage artery

#### 3. Plan/Profile Sheets

##### Drainage

Horizontal Scale 1"=50' minimum

Vertical Scale 1"=5' minimum

##### Roads

Horizontal Scale 1"=40' minimum

Vertical Scale 1"=4' minimum

##### Geometric layout

Centerline

Roadway stations

Finished centerline slopes (0.35% minimum curb and gutter)

Points of vertical intersection

# STORM WATER DRAINAGE AND DETENTION CHECKLIST

Y N N/A

- |  |   |
|--|---|
|  | Drainpipes  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Size  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Type  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Invert elevation                                      |
|  | Structures & Utility lines                            |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Size  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Type  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Invert elevation                                      |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Top elevation   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Finished grade at right-of-way                        |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Hydraulic gradient                                    |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Tailwater elevation                                   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Ditch flow lines                                      |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Utility lines   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Dimension of all servitudes                           |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | North arrow   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Legend  |
|  | 4. Drainage Map/Hydraulic Computations                |
|  | Drainage Map  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | All drainage features                                 |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Right-of-ways and servitudes                          |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Tributary areas                                       |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Watershed boundaries                                  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Structure reference numbers                           |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Discharge points                                      |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | North arrow   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Legend  |
|  | Hydraulic Computations                                |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Design criteria                                       |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Rounded to nearest 0.10 foot                          |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Maximum stages at all nodes                           |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Tailwater elevation                                   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Graphic representation of surface and subsurface flow |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Statement of no adverse impact                        |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Maximum flows (pre vs. post)                          |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Volume runoff (pre vs. post)                          |

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Y N N/A

- |  |                          |                          |   |
|--|--------------------------|--------------------------|---|
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Hydrographs at discharge points (pre vs. post) (Exhibit 6)  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Runoff factors  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Time of concentration   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Land slope  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Onsite elevation determined by routing flows from downstream tailwater elevation  |
| <br>   |                          |                          |   |
| 5. Typical roadway section   |                          |                          |   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Roadway width   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Roadway thickness   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Shoulder width  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Ditch dimensions  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Ditch side slopes   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Location of all utilities   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Subsurface drainage location  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Right-of-way width  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Transverse road slopes  |
| <br>   |                          |                          |   |
| 6. Lot drainage  |                          |                          |   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Storm drain pipe located within street right-of-way   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Special servitude for interconnection or outfall purposes within subdivision  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | All lots inside the Urban Services District and Urban Planning Area graded to drain to the street or to a Major Drainage Artery (Exhibit 1)   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | All lots inside Rural Subdivisions graded to drain to the street or to a Major Drainage Artery (Exhibit 1)  |
| Outside the Urban Services District and Urban Planning Area the HTRPC can allow a portion to drain to the rear if: |                          |                          |   |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | Drainage is to be perpetually privately maintained, or  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | i. Drainage to the rear already exists or is to be dedicated; however, the percentage may not exceed 60% of the total depth of lots up to 225' deep, or that portion greater than 135' on lots greater than 225' deep unless a greater percentage is required to comply with items ii or iii below. |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | ii. Where the size limitation of the roadside ditches will be exceeded  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | iii. Where the size of the curb and gutter drainage pipe exceeds 36" in diameter  |
| <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | 7. Reference standard plan details of all drainage structures   |

## STORM WATER DRAINAGE AND DETENTION CHECKLIST

Y N N/A

- 8. Existing cross sections at maximum 100' intervals showing:
  - Roadway
  - Ditch
  - Lot grades
- 9. Time of concentration
  - a. Rational method
  - b. SCS LAG method
- 10. South of the South Terrebonne Development Zone
  - Minimum roadway elevation +3.5'
  - Minimum lot elevation +2.0'
- B. Closed Storm Drainage System**
  - 1. Minimum sizes
    - 15" minimum diameter
    - 8" minimum diameter for restrictor pipe
  - 2. Minimum Service Life
    - Diameter less than 48" 50 year service life
    - Diameter greater than or equal to 48" 70 years
    - Side drain 30 years
  - 3. Sized to operate full with a minimum self cleansing velocity
  - 4. Slopes
    - Maximum slope 10 ft/sec
    - Outlet protection for velocity above 10 ft/sec
  - 5. Manholes or catch basins
    - Located at all changed in vertical and horizontal direction
    - Maximum Spacing (LaDOTD Hydraulics Manual), but shall not exceed 250'

Pipe Diameter	3-7 ft/sec	8-12 ft/sec	13-20 ft/sec
15"	150'	250'	300'
18"	300'	350'	400'
24" – 36"	400'	450'	500'
42" and larger	600'	650'	700'

- 6. n value taken from Exhibit 8
- 7. Minimum vertical distance of 6" from bottom of pavement to top of drain pipe
- 8. All drainpipes under roadway joined in conformance with LaDOTD Type 3 joints
- 9. Catch basins, manholes and grate inlets in conformance with LaDOTD standard plans

## STORM WATER DRAINAGE AND DETENTION CHECKLIST

Y N N/A

- 10. Minimum servitude for drain pipe
  - Diameter less than 42" = 15'
  - Diameter 42" and greater = 20'
- 11. Inlet spacing
  - LaDOTD HYDR6000 used
  - Gutter flow less than 10 cfs
  - Width of flooding less than 8'
  - Spacing less than 250'
- 12. Pipe size and hydraulic grade line
  - LaDOTD HYDR6020 used
  - Maximum hydraulic clearance at gutter line of 0.2' above gutter grade
  - Design sketches of numbered structures & drainage areas provided
- 13. Other model with prior approval
- C. Open Storm Drainage System
  - 1. Minimum sizes
    - 15" minimum diameter
    - 8" minimum diameter for restrictor pipe
  - 2. Minimum Service Life
    - Cross drains 50 year service life
    - All Storm drain pipe 70 years
    - Side drain 30 years
  - 3. Pipes installed in major drainage arteries shall be sized for a maximum allowable headwater of 0.5' or 1.0' below the edge of roadway whichever is less
    - 4. Outlet protection for velocity above 10 ft/sec
    - 5. n value taken from Exhibit 8
    - 6. Entrance loss coefficients in conformance with LaDOTD Hydraulics Manual
    - 7. Minimum vertical distance of 6" from bottom of pavement to top of drain pipe
    - 8. All drainpipes under roadway joined in conformance with LaDOTD Type 3 joints
    - 9. Minimum servitude for drain pipe
      - Diameter less than 42" = 15'
      - Diameter 42" and greater = 20'

## STORM WATER DRAINAGE AND DETENTION CHECKLIST

Y N N/A

- 10. Roadside ditches
  - 3:1 side slope
  - Maximum depth of 3'-6"
- 11. Ditch centerline not less than 12' from edge of roadway
- 12. Minimum longitudinal ditch invert slope = 0.001 ft/ft
- 13. Minimum road right-of-way with open ditch = 60'
- 14. LaDOTD HYDR1140 used to determine normal depth of flow in channel
- 15. Minimum width of ditch bottom 2'
- 16. n for channels taken from Exhibit 8
- 17. Water surface profile computed and shown on final drawings
- 18. Culvert sizes
  - Future driveway sizes shown on plat
  - Culverts sized as though entire subdivision was subsurface
- 19. Other model with prior approval

### VI. SYSTEM STORAGE

#### A. Detention Facilities:

- 1. Greater than 1 acre
- 2. Compensatory storage
- 3. Type
  - Open basin or pond
  - Roof top storage
  - Parking lot ponding
  - Underground storage
  - Uninhabited areas
  - Designated as raw land
- 4. Drainage Plan
  - Plan
  - Profile
  - Cross Section
  - Pipes & Structures
    - Size
    - Length
    - Invert
  - Design volume
  - Grades
  - Bottom Elevation

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Y N N/A

- |  |   |
|--|---|
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Maximum stage elevation   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 5. Onsite system designed to handle both on-site runoff and conveyance through the site of off-site runoff  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 6. Designed to anticipate, enable and minimize future maintenance needs   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 7. Multiple uses encouraged   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 8. Visual impacts considered  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 9. Adequate access for maintenance personnel  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 10. Maximum depth of parking lot detention 8"   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 11. Slopes for parking lot detention no less than 1% no more than 3%  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 12. Flood surface elevation of parking lot detention at least 1' below the lowest habitable floor elevation of building within 50' of the detention area  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 13. Detention pond slopes   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Interior slope does not exceed 2:1  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Exterior slope does not exceed 3:1  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 14. Private benefit = private ownership   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Methods, procedures and guarantees, including appropriate documentation, that the facilities will be perpetually maintained so as to function as designed and not result in nuisances or health hazards |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 15. Pond dimensions   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | If depth is less than 3' deep minimum width = 6'  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | If depth is 3' or deeper minimum width = 15'  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 16. Landscaped for aesthetic purposes and to stabilize banks  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Seeding and sodding   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | No floatable or erodible material (bark mulch) in interior  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 17. Failure of owner to maintain will be cause for Parish to perform work and bill owner  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 18. Parish maintained pond control structures that do not abut a public right-of-way should be accessible by a 15' minimum right-of-way to allow vehicle access   |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 19. Control structures designed and constructed to operate automatically as much as possible  |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 20. Designed with 1' of freeboard above the elevation of the design flood (except parking lot ponds)  |

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Y N N/A

- 21. Pond design
    - Dry - Sloped no flatter than 0.3% toward drainage outlet
    - Wet – “low flow” channel installed with lining at minimum 0.3% slope
  - 22. Wet pond bottom elevation 1.5 ft below normal low water elevation if constructed flat
  - 23. “Flow through” pond has well defined low flow channel
  - 24. Ponds greater than 4’ in depth have fence and locked gate
  - 25. Design Volume
    - Shown on plans
    - Storage measured from the on-site 25 year stage elevation to a maximum depth of the pump drawdown elevation
    - Wet and dry basins designed so that the portion of their bottom area, which is intended to be dry, shall have standing water no longer than 48 hours for all runoff events equal to or less than the 25-year event
  - 26. Hydraulic losses and structural integrity considered in closed systems on private property
  - 27. Written restriction on final plat stating that no structure, fill or obstructions shall be located within any drainage easement or delineated flood plain
  - 28. All publicly maintained facilities located in a recorded drainage servitude including any necessary for access
- VII. EROSION AND SEDIMENT CONTROL
- A. Design:
    - 1. Required on all proposed developed sites of one acre or greater
    - 2. Incorporated into excavation, construction and post-construction
    - 3. Provisions for interception of all potential silt-laden runoff made before initial clearing and grading
    - 4. Erosion control and storm water pollution plan provided
    - 5. Erosion protection provided for all disturbed areas
  - B. Maintenance agreement provided before building permit is obtained
  - C. Best Management Practices:
    - 1. Existing vegetation preserved where feasible and disturbed portions stabilized as soon as practicable
    - 2. Structural practices to divert flows from exposed soil, store flows, or otherwise limit runoff and the discharge of pollutants from the site to the extent feasible
    - 3. Prevention of the discharge of building materials into the Parish storm sewers or waters of the United States

## STORM WATER DRAINAGE AND DETENTION CHECKLIST

Y N N/A

- 4. Provide general good housekeeping measures to prevent and contain spills
- 5. Implementation of proper waste disposal and waste management techniques
- 6. Timely maintenance of vegetation, erosion and sediment control measures

### VIII. SERVITUDE REQUIREMENTS AND DEDICATION

- A. Ditches not adjacent to a roadway
  - 1. Ditch less than or equal to 4' deep or 18' wide 15' on both sides
  - 2. Ditch greater than 4' deep and/or 18' wide 15' on one side and 20' on the other
  - 3. Parallel ditches minimum 20' crown between
  - 4. Ditch adjacent to roadway not greater than 3.5' and 23' wide
  - 5. Minimum servitude for drain pipe
    - Diameter less than 42" = 15'
    - Diameter 42" and greater = 20'
- B. Letter Of No Objection required for work in parish right-of-way or parish property
- C. Developer's responsibility to record any necessary servitude that are needed to connect a development site with an approved point of discharge