

J. EXHIBIT 10 - Engineering Approval Check List

Y N/A

IV. HYDROLOGY

A. Rainfall

- Desgined 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

- 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
- Drainpipes
 - Size
 - Type

Y N N/A

Invert elevation
Structures & Utility lines

Size

Type

Invert elevation

Top elevation

Finished grade at right-of-way

Hydraulic gradient

Tailwater elevation

Ditch flow lines

Utility lines

Dimension of all servitudes

North arrow

Legend

4. Drainage Map/Hydraulic Computations

Drainage Map

All drainage features

Right-of-ways and servitudes

Tributary areas

Watershed boundaries

Structure reference numbers

Discharge points

North arrow

Legend

Hydraulic Computations

Design criteria

Rounded to nearest 0.10 foot

Maximum stages at all nodes

Tailwater elevation

Graphic representation of surface and subsurface flow

Statement of no adverse impact

Maximum flows (pre vs. post)

Volume runoff (pre vs. post)

Hydrographs at discharge points (pre vs. post) (Exhibit 6)

Runoff factors

Time of concentration

Y N N/A

- Land slope
- Onsite elevation determined by routing flows from downstream tailwater elevation
- 5. Typical roadway section
 - Roadway width
 - Roadway thickness
 - Shoulder width
 - Ditch dimensions
 - Ditch side slopes
 - Location of all utilities
 - Subsurface drainage location
 - Right-of-way width
 - Transverse road slopes
- 6. Lot drainage
 - Storm drain pipe located within street right-of-way
 - Special servitude for interconnection or outfall purposes within subdivision
 - 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)
 - 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:
 - Drainage is to be perpetually privately maintained, or
 - 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.
 - ii. Where the size limitation of the roadside ditches will be exceeded
 - iii. Where the size of the curb and gutter drainage pipe exceeds 36" in diameter
 - 7. Reference standard plan details of all drainage structures
 - 8. Existing cross sections at maximum 100' intervals showing:
 - Roadway
 - Ditch
 - Lot grades
 - 9. Time of concentration
 - a. Rational method
 - b. SCS LAG method

Y N N/A

- 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
- 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'

Y N N/A

- 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'
 - 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

Y N N/A

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
- Maximum stage elevation
5. Onsite system designed to handle both on-site runoff and conveyance through the site of off-site runoff
6. Designed to anticipate, enable and minimize future maintenance needs
7. Multiple uses encouraged
8. Visual impacts considered
9. Adequate access for maintenance personnel
10. Maximum depth of parking lot detention 8"
11. Slopes for parking lot detention no less than 1% no more than 3%
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
13. Detention pond slopes
- Interior slope does not exceed 2:1
- Exterior slope does not exceed 3:1

- 14. Single lot = private ownership
- 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
- 15. Pond dimensions
- If depth is less than 3' deep minimum width = 6'
- If depth is 3' or deeper minimum width = 15'
- 16. Landscaped for aesthetic purposes and to stabilize banks
- Seeding and sodding
- No floatable or erodible material (bark mulch) in interior
- 17. Failure of owner to maintain will be cause for Parish to perform work and bill owner
- 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
- 19. Control structures designed and constructed to operate automatically as much as possible
- 20. Designed with 1' of freeboard above the elevation of the design flood (except parking lot ponds)
- 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 maintained by parish greater than 4' in depth have fence and locked gate unless considered a recreational amenity and approved by the Planning Commission
- 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

- 29. All stumps within ponds flush with design invert
- 30. No stumps in the slope/bank

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
- 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