

1. PAVING

I. DESIGN THICKNESS OF PAVING 6" CONCRETE PAVING
 II. STABILIZED SUBGRADE TO A DEPTH OF 6" MIN.
 III. DESIGN STRENGTH OF CONCRETE 3000 psi
 IV. TYPE AND PLACEMENT OF STEEL: AS PER SPECS

NOTES:
 I - IV TO BE COMPLETED ONLY IF PAVING IS TO BE ACCEPTED BY HARRIS COUNTY

DRIVEWAYS

I. NUMBER OF DRIVEWAY APPROACHES PROPOSED: 0
 II. HARRIS COUNTY STANDARD DRIVEWAY DETAIL APPEARS ON SHEET _____

NOTES:
 I - II TO BE COMPLETED ONLY IF PROJECT ENTAILS CONSTRUCTION OF DRIVEWAYS AT TIME OF DEVELOPMENT

FIRE APPARATUS ACCESS ROAD

REQUIRED AND SHOWN ON SHEET(S) _____
 NOT REQUIRED DUE TO _____

CURBING

I. ISLANDS AND MEDIANS REQUIRE STANDARD 6" CURBING
 II. STANDARD 6" CURBING PROPOSED
 4" x 12" CURBING PROPOSED
 6" OR 4" x 12" ALLOWED EXCEPT AT MEDIANS AND ISLANDS

TRAFFIC CONSIDERATIONS

I. **MEDIAN CUTS**
 NO MEDIAN CUT OR RELOCATION IS PROPOSED
 MEDIAN MODIFICATIONS ARE SHOWN ON SHEET _____

II. **LEFT HAND TURN**
 NO LEFT TURN LANE IS PROPOSED
 LEFT TURN LANE IS SHOWN ON SHEET _____

III. **TRAFFIC CONTROL PLAN**
 NO WORK IN THE RIGHT OF WAY IS PROPOSED THAT WOULD INTERFERE WITH TRAFFIC FLOW
 TRAFFIC CONTROL SHOWN ON SHEET _____

IV. **EXISTING TRAFFIC CONTROL**
 DEVICES SHOWN ON PLANS (T.C. BOXES AND LOOPS)

NOTES:
 I - III TO BE COMPLETED FOR ALL PROJECTS

6. STORM WATER QUALITY

I. **CONSTRUCTION PROTECTIVE MEASURES.**
 SWPPP SITE PLAN AND DETAILS ON SHEET(S) 5 & 18

II. **APPLICABILITY FOR PERMANENT FEATURES.**

EXEMPT NEW DEVELOPMENT OF LESS THAN 5 ACRE PARCEL.
 EXEMPT REDEVELOPMENT OF A 5 ACRE OR LARGER PARCEL WHERE TOTAL IMPERVIOUS SURFACE (EXISTING PLUS PROPOSED) IS LESS THAN 1 ACRE.
 EXEMPT "GRAND FATHERED" BY AN EXISTING STORM SEWER LINE.
 "STORM WATER QUALITY MANAGEMENT PLAN" HAS BEEN/WILL BE INCLUDED IN A SEPARATE SUBMITTAL ENTITLED _____
 "STORM WATER QUALITY MANAGEMENT PLAN" INCLUDED. SWQMP SITE PLAN ON SHEET(S) 4

III. **STORM WATER QUALITY FEATURES.**

VEGETATIVE CONTROLS USED: (FILTER STRIP, GRASSY SWALE, URBAN FORESTRY) DETAILS AND CALCULATIONS APPEAR ON SHEET(S) _____
 POND STRUCTURE USED (WET, DRY, WETLANDS) DETAILS AND CALCULATIONS APPEAR ON SHEET(S) 4 & 19
 HYDRODYNAMIC TYPE SEPERATOR MODEL: _____
 OTHER(S): _____

NOTES:
 I - II REQUIRED ON ALL PROJECTS, III IF NOT EXEMPT OR "GRANDFATHERED"

NOTE: IF A MAJOR CATEGORY ON THIS SHEET IS NOT REQUIRED FOR THE PROJECT, "X" THROUGH THAT ENTIRE SECTION. CATEGORY (6) MUST BE COMPLETED.

2. SUBDIVISION DRAINAGE

I. **DRAINAGE SYSTEM TYPE**
 STORM SEWER
 ROADSIDE DITCH

II. **DESIGN METHOD USED**
 CITY OF HOUSTON 2 YR FREQUENCY
 OTHER _____

III. **DRAINAGE SYSTEM OUTFALL**
 TO DETENTION POND
 DETENTION POND MAINTAINED BY Villas at Willowbrook H.O.A.
 TO HCFCD DRAINAGE DITCH UNIT NO. _____
 TO HARRIS COUNTY ROADSIDE DITCH
 ROAD NAME: SCHROEDER RD.

IV. **STORM WATER OUTFALL**
 STATIC W.S.E. @ OUTFALL IS _____
 PROPOSED STORM SEWER IS SUBMERGED.
 CAPACITY ALLOCATED TO TRACT FROM D. A. MAP: 6 (CFS)
 FROM DRAINAGE AREA MAP DATED: 04-21-05
 PREPARED BY: BOBBY K. WILSON, P.E.
 ACTUAL OUTFALL RATE: 2 (CFS)

OTHER: _____

V. **DRAINAGE SYSTEM FLOW RATE**
 FLOW PRIOR TO DETENTION: 42 cfs
 FLOW AFTER DETENTION (IF REQUIRED): 2 cfs

NOTES:
 I - IV REQUIRED ON ALL SUBDIVISION TYPE PROJECTS INCLUDING MANUFACTURED HOME PARKS.

7. FLOOD CONTROL DISTRICT CRITERIA

I. **DETENTION SUMMARY**

STORMWATER DETENTION BASIN ROUTING TABLE

DETENTION BASIN DRAINAGE AREA = 8.54 ACRES

RAINFALL EVENT PROBABILITY	PRE-DEVELOPED PEAK RUNOFF (CFS)	POST-DEVELOPED PEAK RUNOFF (CFS)	DETENTION BASIN PEAK OUTFLOW (CFS)	MAXIMUM WATER SURFACE ELEVATION	PEAK STORAGE VOLUME (AC-FT)	STORAGE RATE (AC-FT PER AC)
10% EXCEEDANCE (10-YEAR)	N/A		2	130	6.5	.76
1% EXCEEDANCE (100-YEAR)	42	2				

ADDITIONAL CRITERIA FOR PUMPED DETENTION BASINS:
 VOLUME OF PUMPED 1% EXCEEDANCE STORAGE VOLUME = 6.5 AC-FT .75 % OF TOTAL VOLUME
 MAXIMUM DESIGN OUTFLOW VELOCITY INTO HCFCD CHANNEL = 3 CFS
 DRAIN TIME FOR BASIN = 28 HOURS BASED ON _____ MAXIMUM HEAD CONDITIONS.

STORMWATER DRAINAGE DESIGN REPORT

PRELIMINARY ENGINEERING REPORT, DETENTION BASIN WITH PUMPED OUTFALL INTO SCHROEDER ROAD SERVING VILLAS AT WILLOWBROOK, IN HARRIS COUNTY

REPORT TITLE _____
 REPORT DATE REV. 04-21-05 ENGINEERING FIRM PROVIDENT CONSULTING, INC.
 DATE OF ACKNOWLEDGEMENT BY HCFCD OR FLOODPLAIN ADMINISTRATOR 05-13-05

STORMWATER DETENTION FOR THE PROPOSED WORK CONTAINED IN THESE PLANS IS PROVIDED BY OTHER PLANS:
 PLAN TITLE _____
 ENGINEERING FIRM _____ DATE SIGNED BY HCFCD _____

II. HCFCD STANDARD NOTES: SEE SHEET 3 OF THESE PLANS.

III. HCFCD STANDARD DETAILS: SEE SHEET 20 OF THESE PLANS.

IV. REFER TO PLAN SHEETS 13 FOR EXISTING AND PROPOSED RIGHT OF WAY DELINEATION AND COMPLETE RECORDING INFORMATION TO INCLUDE CLERK'S FILE NUMBERS, TYPE OF ESTATE (e.g., DRAINAGE EASEMENT, FEE STRIP, ETC.) AND GRANTEE (e.g. COH, HCFCD, PUBLIC, TXDOT, ETC.)

NOTES:
 I. COMPLETE ONLY IF HCFCD OR HARRIS COUNTY IS REQUIRING DETENTION.
 II. COMPLETE ONLY IF PROJECT HAS WITHIN IT OR IS IMMEDIATELY ADJACENT TO AN EXISTING OR PROPOSED HCFCD MAINTAINED CHANNEL OR DETENTION BASIN.
 III. COMPLETE ONLY IF PROJECT INCLUDES NEW OUTFALL, BACKSLOPE INTERCEPTOR OR OTHER RELATED WORK WITHIN AN EXISTING OR PROPOSED HCFCD MAINTAINED CHANNEL OR DETENTION BASIN.
 IV. COMPLETE ONLY OF PROJECT HAS WITHIN OR IMMEDIATELY ADJACENT TO AN EXISTING OR PROPOSED PUBLIC DRAINAGE CHANNEL OR DETENTION BASIN.

3. SITE DRAINAGE
 (OTHER THAN SUBDIVISION TYPE PROJECTS)

I. **PROPOSED DRAINAGE AREA**
 NEW DEVELOPMENT AREA: _____
 RE-DEVELOPMENT AREA (AMOUNT INCREASED IMPERVIOUS AREA): _____

II. **DETENTION VOLUME (DRY BASIN)**
 NEW AREA _____ X 0.65 = _____ ACRE-FEET
 DETENTION REQUIRED _____
 PROPOSED VOLUME = _____ ACRE FEET

III. **OUTFALL**
 OUTFALL TO ROADSIDE DITCH
 STORM SEWER
 OTHER _____
 STATIC W.S.E. @ OUTFALL IS _____
 ROADSIDE DITCH OUTFALL: _____
 ROAD FRONTAGE _____ X 0.0088 = _____ (CFS) ALLOWABLE OUTFALL
 PROPOSED OUTFALL RATE: _____

STORM SEWER OUTFALL
 CAPACITY ALLOCATED TO TRACT FROM D. A. MAP: _____ (CFS)
 FROM DRAINAGE AREA MAP DATED: _____
 PREPARED BY: _____ (CFS)
 ACTUAL OUTFALL RATE: _____ (CFS)

IV. **PUMPED DETENTION FACILITIES**
 VOLUME THAT GRAVITY FLOWS: _____ ACRE FEET
 VOLUME THAT IS PUMPED: _____ ACRE FEET
 ENTRANCE VELOCITY INTO ROADSIDE DITCH OR STORM SEWER: _____
 PUMP SPECIFICATIONS AND OPERATING PLAN APPEAR ON SHEET _____

V. **FLOW RESTRICTOR SIZE**
 OUTFALL PIPE SIZE: _____
 RESTRICTOR PIPE SIZE: _____

VI. PROPOSED STORM SEWER IS SUBMERGED.

NOTES:
 I. REQUIRED FOR ALL PROJECTS OTHER THAN SUBDIVISION TYPE PROJECTS. DEVELOPMENT AREA INCLUDES ALL AREA WHERE BUILDING, PAVING OR GRADING WILL OCCUR. AREAS NOT INCLUDED BUT WITHIN THE PROPERTY'S BOUNDARIES MUST BE DELINEATED AS A "NO WORK" AREA ON THE DRAWINGS.
 II. - V. REQUIRED WHEN PROPOSED FACILITY WILL INCREASE THE AMOUNT OF RUNOFF INTO A COUNTY DRAINAGE DITCH, ROADSIDE DITCH OR STORM SEWER. IF ANALYZED AND THE RECEIVING DRAINAGE STRUCTURE HAS CAPACITY IN THE FULLY DEVELOPED CONDITION OF THE AREA IT SERVES, NO DETENTION IS REQUIRED.

4. WATER AND WASTEWATER

I. **TYPE OF SERVICE PROPOSED**
 MUNICIPALITY: _____
 MUNICIPAL UTILITY DISTRICT: H.C.M.U.D. 191
 OTHER DISTRICT: _____
 PRIVATE WATER AND WASTEWATER SYSTEMS
 PRIVATE WATER SYSTEM AND INDIVIDUAL OSSF
 INDIVIDUAL WATER WELL AND OSSF
 OTHER: _____
 NO UTILITIES ARE PROPOSED

II. **PROOF OF CAPACITY**
 LETTER FROM DISTRICT AUTHORIZING SERVICE AND CONNECTION
 TCEQ APPROVAL FOR WATER SYSTEM AND PERMIT FOR WASTEWATER SYSTEM.
 TCEQ APPROVAL FOR WATER SYSTEM AND OSSF FEASIBILITY REPORT
 OSSF FEASIBILITY REPORT WHICH CONSIDERS INDIVIDUAL WELLS

III. **AMOUNT OF FLOW**
 RESIDENTIAL: 94 LOTS OR UNITS
 COMMERCIAL: _____ AVERAGE DAILY FLOW
 OTHER: _____

NOTES:
 I. COMPLETE FOR ALL PROJECTS
 II. COMPLETE FOR ALL PROJECTS.
 III. COMPLETE ONLY IF TCEQ DISCHARGE PERMIT IS PROPOSED

5. DESCRIPTION OF PROPERTY

I. **LEGAL DESCRIPTION / PLAT NAME:**
VILLAS AT WILLOWBROOK

NEW PLAT LOCATED IN THESE SURVEYS:
JOHN MERRY SURVEY, A-49 and
GILBERT BROOKS SURVEY, A-6

REPLAT OF RECORDED SUBDIVISION OR RESERVE KNOWN AS _____

II. **ADJACENT ROADS** SOUTH of CYPRESSWOOD RD., EAST of SCHROEDER RD., WEST of HARGRAVE RD., & NORTH of SH 249.

III. **JURISDICTIONS**
 CITY OF HOUSTON
 CITY OF _____
 ETJ, CITY OF CITY of HOUSTON
 UTILITY DISTRICT: HARRIS COUNTY MUD 191
 OTHER: _____

NOTES:
 I. COMPLETE FOR ALL PROJECTS
 II. COMPLETE ONLY IF PROJECT LIES ADJACENT TO A PUBLIC OR PRIVATE ROAD
 III. COMPLETE FOR ALL PROJECTS

8. FLOOD PLAIN STATUS

I. **GENERAL INFORMATION**
 FIRM PANEL(S) FOR PROPERTY: 48201C0340 J
 FIRM PANEL(S) DATE: NOV. 6, 1996
 STATUS OF PROPERTY ON MAP
 LOCATED IN UNSHADED ZONE "X"
 ENTIRELY LOCATED IN SHADED AND UNSHADED ZONE "X"
 LOCATED PARTIALLY IN ZONE "AE" DELINEATE ON CONSTRUCTION DRAWINGS (DRAINAGE LAYOUT)
 LOCATED ENTIRELY IN ZONE "AE" (INDICATE BASE FLOOD LEVEL ON CONSTRUCTION DRAWINGS)
 OTHER _____
 SITE REMOVED FROM FLOODPLAIN BY LOMA OR LOMR-F CASE NO. _____

FLOOD HAZARD RECOVERY DATA
 FLOOD HAZARD RECOVERY DATA AVAILABLE AND UTILIZED (PROVIDED INFORMATION BASED ON 1973 AND 2001 ADJUSTMENTS).
 FLOOD HAZARD RECOVERY DATA NOT AVAILABLE.

ELEVATION INFORMATION
 BENCHMARK USED
 FEMA RM benchmark
 HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT BENCHMARK (FOR COASTAL AREAS)
 OTHER _____

DESCRIPTION OF BENCHMARK INCLUDING ELEVATION, DATUM AND YEAR OF ADJUSTMENT. BENCHMARK: NATIONAL GEODETIC SURVEY MARKER
 Y1216, 1973 ADJ., ELEV = 125.994
 Y1216, 1978 ADJ., ELEV = 125.406
 Y1216, 1988 ADJ., ELEV = 123.94
 ELEVATIONS ARE BASED ON 1973 ADJUSTMENT

II. **FLOOD PLAIN DETERMINATION BASED ON GROUND ELEVATION**
 PROPERTY LIES ENTIRELY ABOVE THE BASE FLOOD LEVEL AND IN ZONE "X" (SHADED OR UNSHADED)
 PROPERTY LIES PARTIALLY BELOW THE BASE FLOOD LEVEL (MUST BE DELINEATED ON TOPOGRAPHIC SURVEY)

III. **FLOODPLAIN STORAGE SUMMARY** (APPLIES ONLY TO PORTION OF LAND LOCATED WITHIN FLOODPLAIN AS DELINEATED BY FIRM PANEL).
 A. TOTAL VOLUME OF MATERIAL PROPOSED TO BE PLACED WITHIN THE FIRM DELINEATED FLOODPLAIN (FILL, BASE, CONCRETE, ASPHALT, ETC.):
 i.e., BELOW ELEVATION (19 ADJ.) _____ CUBIC YARDS
 B. TOTAL VOLUME OF MATERIAL PROPOSED TO BE REMOVED FROM THE FIRM DELINEATED FLOODPLAIN:
 i.e., BELOW ELEVATION (19 ADJ.) _____ CUBIC YARDS

NOTES:
 I. COMPLETE FOR ALL PROJECTS
 II. COMPLETE ONLY IF PROJECT IS ADJACENT TO 100-YEAR FLOOD PLAN

IV. LOMR REQUIRED
 VERIFIED BY: SL

HCPID SIGNATURE BLOCK

PROJECT KNOWN AS:
VILLAS at WILLOWBROOK, WATER, SANITARY,
STORM SEWER, & PAVING IMPROVEMENTS in H.C.M.U.D.191
 WAS ACCEPTED BY THE FOLLOWING GROUPS FOR THE PURPOSES LISTED BELOW:

ENGINEERING DIVISION

BY _____ INTERPOSE NO OBJECTION DATE _____
 AS TO PAVING AND/OR DRAINAGE ONLY
 BY Shannon C. Watson DATE 9 Jan 06

BY _____ AS TO LOCATION OF ITEMS IN COUNTY RIGHT OF WAY DATE _____
 AS TO STORM WATER QUALITY
 BY Shannon C. Watson DATE 9 Jan 06

HARRIS COUNTY FLOOD CONTROL DISTRICT

BY _____ INTERPOSE NO OBJECTION DATE _____
 FOR ITEMS LOCATED OUTSIDE OF HCFCD RIGHT-OF-WAY
 BY Diane B. Sal DATE 11/2/05

BY _____ FOR ITEMS LOCATED WITHIN EXISTING HCFCD RIGHT-OF-WAY DATE _____
 APPROVED: _____

BY _____ FOR ITEMS LOCATED WITHIN PROPOSED HCFCD RIGHT-OF-WAY DATE _____
 APPROVED: _____

ADDITIONAL COMMENTS:
Detention basin not intended to be maintained by HCFCD.

THE PROJECT WAS REVIEWED, HOWEVER, THIS DOES NOT MEAN THE ENTIRE PROJECT, INCLUDING ALL SUPPORTING DATA AND CALCULATIONS HAVE BEEN COMPLETELY CHECKED AND VERIFIED. THESE DRAWINGS ARE SIGNED, DATED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS, WHICH THEREFORE CONVEYS THE ENGINEER'S RESPONSIBILITY AND ACCOUNTABILITY. THIS DOES NOT RELIEVE ANY PARTY FROM COMPLYING WITH ANY OTHER LEGALLY ADOPTED REGULATION OR ORDINANCE RELATED TO LAND DEVELOPMENT. IF THE CITY SIGNATURES ARE REQUIRED BY ORDINANCE, COUNTY PERMITS WILL NOT BE ISSUED UNTIL SUCH SIGNATURES ARE OBTAINED. THESE SIGNATURES ARE VALID FOR A MAXIMUM OF TWO YEARS.

ENGINEER'S CERTIFICATION

I, BOBBY K. WILSON, P.E., A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF TEXAS DO HEREBY CERTIFY THAT THE INFORMATION PRESENTED ON THIS SHEET IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UNLIMITED PROJECT CONSISTS OF DRAWING SHEETS 1 THRU 24
Boobby K. Wilson 10-24-05
 SIGNATURE DATE

REVISIONS

DATE	SHEET	DESCRIPTION	ACKNOWLEDGMENT

VILLAS at WILLOWBROOK, WATER, SANITARY,
 STORM SEWER, & PAVING IMPROVEMENTS in H.C.M.U.D.191

REQUEST NO. 207217 APPLICANT NO. 43458 SHEET NUMBER 2 OF 24

**HARRIS COUNTY
 PUBLIC INFRASTRUCTURE DEPARTMENT
 EXPRESS REVIEW SHEET**