STORMWATER CALCULATIONS:

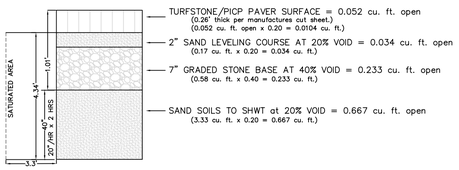
STORMWATER MANAGEMENT CALCULATIONS:	
DESIGN DATA	DESIGN STORM: 4.3 INCH RAINFALL EVENT OVER A 2 HOUR PERIOD
	INFILTRATION RATE = 20 INCHES PER HOUR
	INTERSTITIAL SOIL VOID (POROSITY): 20%
	GRAVEL VOID (POROSITY): 40%
	RUNOFF COEFFICIENT = 1.0
	SHWT ELEVATION = 4.0' +/-
	REFERENCE SOILS REPORT PREPARED BY PROTOCOL SAMPLING SERVICE, INC., DAVID E. MEYER, N.C.L.S.S.. THE REPORT IS DATED "pending"

DA1 – PARKING AND DRIVE DRAINAGE AREA

DRAINAGE AREA 1: BUILT UP AREA	
CONCRETE DRIVE AND BORDER	2,662 sq.ft.
PAVER DRIVE (UNADJUSTED)	6,859 sq.ft.
DUMPSTER PAD	70 sq.ft.
FRONT CONCRETE APRONS	1,812 sq.ft.
TOTAL BUILT UPON AREA	11,403 sq.ft.

STORMWATER GENERATED BY DA 1 BUILT UPON AREA:
11,403 sq.ft. X 4.3/12 = 4,086 cu.ft.

STORMWATER STORAGE VOLUME IN TURFSTONE/PICP PAVERS, GRAVEL AND SOILS:



TOTAL STORAGE VOLUME PER SQ. FT. OF PAVING SURFACE = 0.986 cu.ft. per sq.ft.
TURFSTONE PAVING AREA = 6,859 sq.ft.
TOTAL STORAGE VOLUME IN TURFSTONE PAVING SURFACE = 6,859 x 0.986 = 6,762 cu.ft.

TURFSTONE STORAGE VOLUME IN TURFSTONE SATURATED ZONE:
SATURATED AREA = 19,767 cu. ft.
(3.3' OFFSET OF TURFSTONE AREA LESS TURFSTONE AREA X 3.3')
SATURATED AREA STORAGE VOLUME at 20% VOID = 1,330 cu. ft.
(19,767 cu. ft. x 0.20 = 3,953 cu. ft.)

TOTAL STORAGE AVAILABLE IN TURFSTONE PAVER AREA and SATURATION ZONE = 8,092 cu.ft.

DA2 – BUILDING TYPE A ROOF AREA

DRAINAGE AREA 2: BUILT UP AREA	
ROOF AREA	1,294 sq.ft.
TOTAL BUILT UPON AREA	1,294 sq.ft.

ROOF DRAINS TO REAR YARD INFILTRATION GALLERY – SEE DETAIL SHEET 4

STORMWATER GENERATED BY DA 1 BUILT UPON AREA:
1,294 sq.ft. X 4.3/12 = 464 cu.ft.

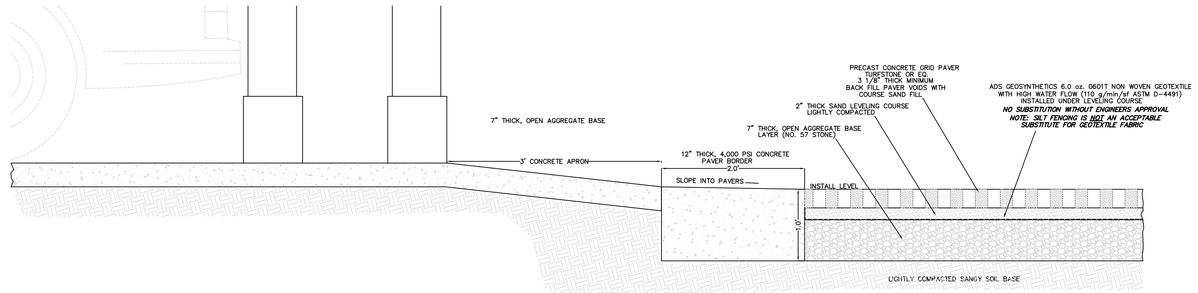
STORMWATER STORAGE VOLUME IN REAR YARD INFILTRATION GALLERY:

a.) OPEN STORAGE IN TWO 35 L.F. 18" CULVERT PIPES = 35 ft x 1.77 sq.ft. x 2 = 123.9 cu.ft.
b.) INTERSTITIAL STORAGE IN GRAVEL BED =
(5.5 ft x 3.0 ft. x 70 l.f.) x 0.40 = 462 cu.ft. –123.9 cu.ft. = 338 cu.ft.
TOTAL GRAVEL BED VOLUME LESS OPEN STORAGE IN PIPES
c.) INTERSTITIAL STORAGE IN SAND BELOW GRAVEL BED =
(5.5 ft x 3.3 ft. x 35 l.f.) x 0.40 = 254.1 cu.ft.
GRAVEL BED AREA x SATURATION DEPTH x GRAVEL BED POROSITY
SATURATION DEPTH = 20 INCHES PER HOUR x 2 hours = 3.3 ft.
GRAVEL BED VOID (POROSITY): 40%
d.) TOTAL STORAGE AVAILABLE IN REAR YARD INFILTRATION GALLERY = 716 cu.ft.

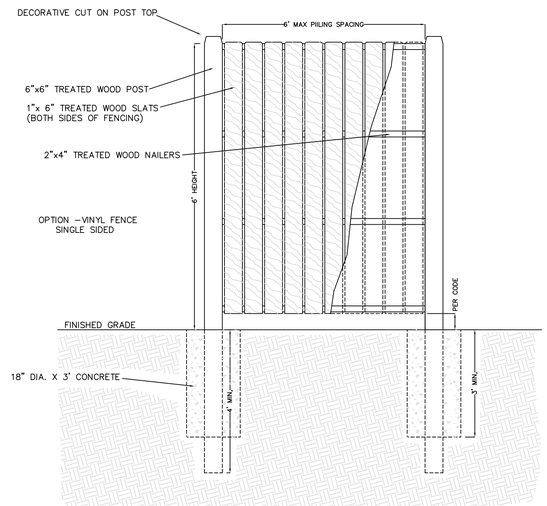
SUMMARY:

APPLYING A 4.3 INCH RAINFALL ON THE CONCRETE ROADWAY BORDER, PAVER ROADWAY SURFACE, FRONT CONCRETE APRONS AND THE DUMPSTER PAD YIELDS 4,086 cu. ft. OF WATER TO MANAGE. THE PAVER SURFACE, UNDERLYING GRAVEL AND THE SANDY SUBSOILS WILL STORE 8,092 cu. ft. OF WATER. THIS IS MORE THAN SUFFICIENT TO ALLOW THE NOTED SURFACES TO BE "SELF–MANAGING" FOR STORMWATER PURPOSES AND ACTUALLY EQUATES TO A DESIGN STORM OF APPROXIMATELY 8.5 INCHES.
A SLOT DRAIN NEAR THE PROJECT ENTRANCE WILL INTERCEPT ANY OVERFLOW RUNNING DOWN THE ROADWAY AND DIRECT IT TO TWO SHALLOW INFILTRATION BASINS ON EITHER SIDE OF THE ROADWAY ENTRANCE.

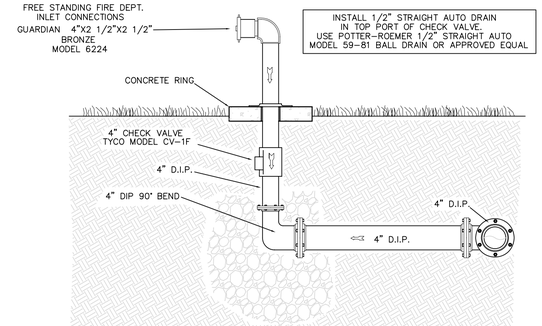
AN INFILTRATION GALLERY WILL BE CONSTRUCTED IN THE REAR YARD OF EACH OF THE TYPE A UNITS. THE GALLERY WILL CONSIST OF TWO PARALLEL RUNS OF 18" ADS PERFORATED PIPE WITH A GEO–TEXTILE WRAP. THE PIPES WILL BE ENCASED IN A GRAVEL BED CONSISTING OF WASHED NO. 12 STONE. THE ROOF OF EACH UNIT WILL INCLUDE A GUTTER COLLECTION SYSTEM WHICH DIRECTS ALL ROOF RUNOFF TO THE GALLERY.
APPLYING A 4.3 INCH RAINFALL ON THE ENTIRE ROOF SURFACE YIELDS 464 cu.ft. OF WATER TO BE MANAGED. THE INFILTRATION GALLERY PIPE, GRAVEL BED AND UNDERLYING SANDY SOILS, CAN MANAGE 716 cu.ft. OF ROOF DISCHARGE. THIS VOLUME IS MORE SUFFICIENT TO MANAGE THE 4.3 INCH DESIGN STORM AND ACTUALLY EQUATES TO A DESIGN STORM OF 6.6 INCHES.



ROADWAY SECTION WITH UNIT DRIVEWAY CONNECTION DETAIL
NOT TO SCALE



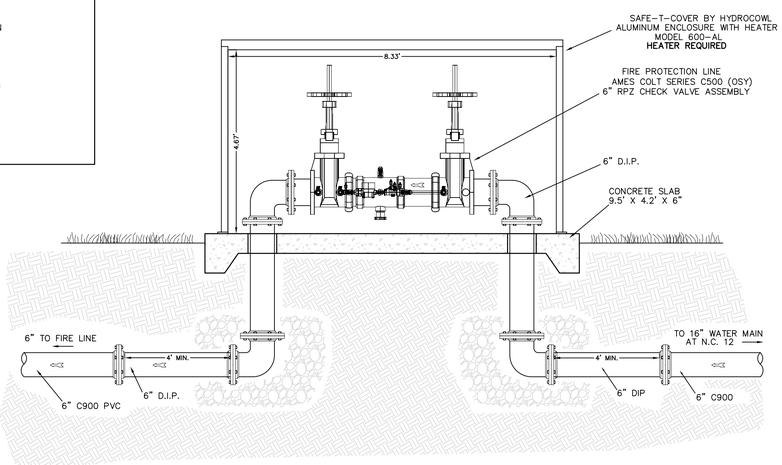
WOOD FENCE DETAIL
NOT TO SCALE



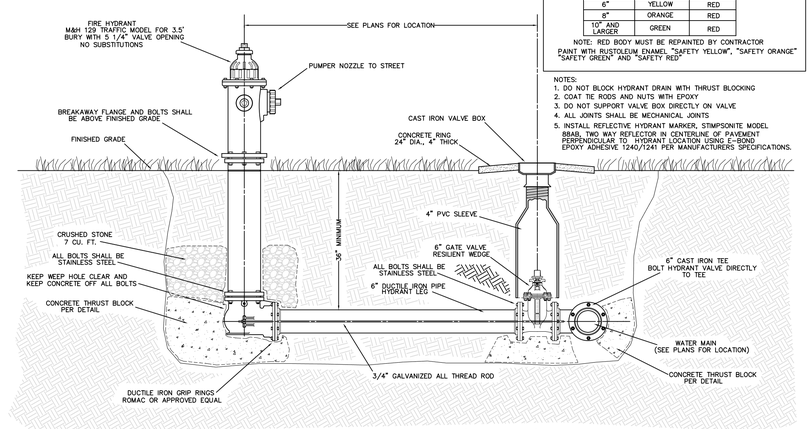
FIRE DEPARTMENT CONNECTION
NOT TO SCALE

SIGN TYPE 1

SIGN TYPE 2



6" BACK FLOW PREVENTION
NOT TO SCALE



PAINTING REQUIREMENTS FOR NEW FIRE HYDRANTS

WATERLINE DIAMETER	BONNETT	BODY
6"	YELLOW	RED
8"	ORANGE	RED
10" AND LARGER	GREEN	RED

NOTE: RED BODY MUST BE REPAINTED BY CONTRACTOR
PAINT WITH RUSTOLEUM ENAMEL "SAFETY YELLOW", "SAFETY ORANGE" "SAFETY GREEN" AND "SAFETY RED"

NOTES:
1. DO NOT BLOCK HYDRANT DRAIN WITH THRUST BLOCKING
2. COAT TIE RODS AND NUTS WITH EPOXY
3. DO NOT SUPPORT VALVE BOX DIRECTLY ON VALVE
4. ALL JOINTS SHALL BE MECHANICAL JOINTS
5. INSTALL REFLECTIVE HYDRANT MARKER, STIMPSONITE MODEL 88A8, TWO WAY REFLECTOR IN CENTERLINE OF PAVEMENT PERPENDICULAR TO HYDRANT LOCATION USING E–BOND EPOXY ADHESIVE 1240/1241 PER MANUFACTURERS SPECIFICATIONS.

FIRE HYDRANT AND VALVE INSTALLATION DETAIL
NOT TO SCALE

MICHAEL W. ROBINSON, P.E., P.L.S.
ENGINEERING AND SURVEYING
P.O. BOX 2852
KILL DEVIL HILLS, NC 27948
PHONE: 252–255–8026
EMAIL: mrobinson@obxengineering.com

DETAIL SHEET
PRELIMINARY

NORTH CAROLINA PROFESSIONAL SEAL 18994 ENGINEER MICHAEL W. ROBINSON

REVISIONS

NO.	DATE	DESCRIPTION	BY

PROJECT:
OCEANFRONT COMMUNITY
KILL DEVIL HILLS DARE COUNTY NORTH CAROLINA
707 AND 709 NORTH VIRGINIA DARE TRAIL, KILL DEVIL HILLS

DATE: 11–03–20	SCALE: 1"=20'
DESIGNED: MWR	DRAWN: MWR
SHEET: 5 OF 5	
CAD FILE: mwp–707 and 709 nvdt–kdh–base.dwg	
PROJECT NO: 082720	