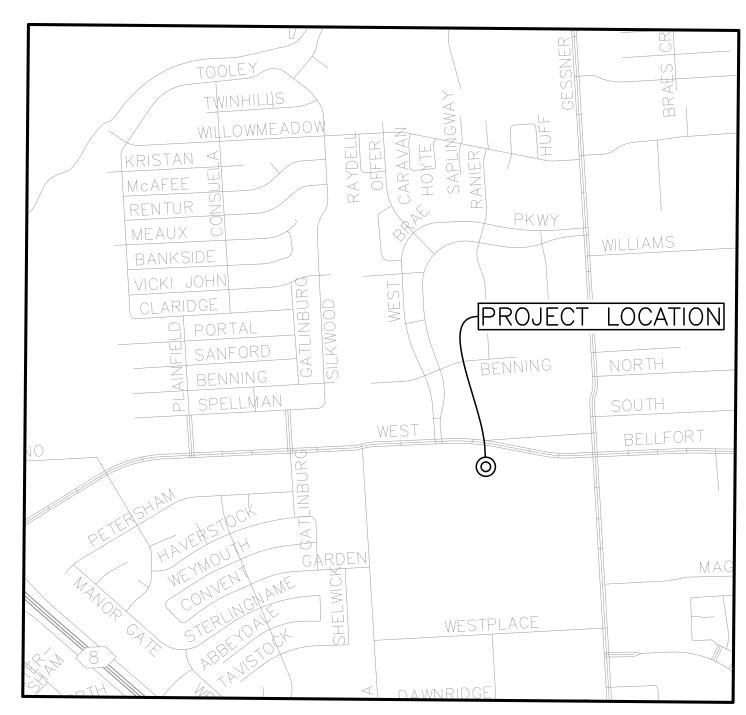
# PROPOSED PAVING & STORM SEWER TO SERVE HOUSTON COMMUNITY COLLEGE - BRAYS OAKS PARKING EXPANSION

# 8855 W BELLFORT BLVD HOUSTON, TX 77031

# J FAIRMONT PKW PROJECT LOCATION

LOCATION MAP



VICINITY MAP KEY MAP: 570B LAMBERT: 5053 GIMS: 5053C ZIP CODE: 77031

CO.O - COVER SHEET

DRAINAGE AREA MAP & DETENTION PLAN

C4.0 - SWPPP

C5.0 - PAVEMENT DETAILS, 1 OF 2

C5.1 - PAVEMENT DETAILS, 2 OF 2 C5.2 - STORM DETAILS

E0.01 - ELECTRICAL SPECIFICATIONS

E0.02 - ELECTRICAL SCHEDULES & LEGENDS E2.00 - ELECTRICAL SITE PLAN

E4.00 - ELECTRICAL DETAILS

E6.00 - ELECTRICAL ONE LINE AND PANEL SCHEDULES

, ALAN L. LACKEY, P.E., HEREBY ACKNOWLEDGE THAT I HAVE REVIEWED THE NEW FLOOD HAZARD RECOVERY DATA AND USED THE MOST RESTRICTIVE INFORMATION FOR THE DESIGN OF THIS PROJECT.

CONTRACTOR SHALL NOTIFY THE CITY OF HOUSTON -HOUSTON PUBLIC WORKS, OFFICE OF THE CITY ENGINEER, 48 HOURS BEFORE STARTING WORK ON THIS PROJECT. (TELEPHONE NUMBER. 832-394-9098)

(BLDG PERMIT ILMS: 19032517 STORM. INFO. FORM LOG NO.: TBA

> BENCHMARK:
> TSARP MONUMENT NO. 040395 — A BRASS DISK IN CONCRETE LOCATED NEAR AN ASPHALT ROAD APPROXIMATELY 100 FEET NORTH OF WILLOW MEADOW DRIVE NEAR ITS DEAD END AT KEEGANS BAYOU. ELEVATION = 66.41 (NAVD 1988, 2001 ADJUSTMENT)

A 5/8-INCH IRON ROD WITH RED CAP STAMPED "MCKIM

& CREED" SET NEAR THE NOSE OF AN ESPLANADE IN WEST BELLFORT DRIVE APPROXIMATELY 56.9 FEET NORTHEAST OF THE NORTHEAST CORNER OF UNRESTRICTED RESERVE "B" OF THE PLAT OF HISD WELCH MIDDLE SCHOOL.

ELEVATION = 66.67 (NAVD 1988, 2001 ADJUSTMENT)

TBM 103:

A 5/8-INCH IRON ROD WITH RED CAP STAMPED "MCKIM & CREED" SET APPROXIMATELY 80.6 FEET NORTH AND 21.0 FEET WEST OF A 5/8-INCH IRON ROD WITH "C.L. DAVIS" CAP FOUND FOR THE SOUTHWESTERLY CORNER OF UNRESTRICTED RESERVE "B" OF THE PLAT OF HISD WELCH MIDDLE SCHOOL.

ELEVATION = 66.85 (NAVD 1988, 2001 ADJUSTMENT)

**FLOODPLAIN NOTE:** ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), FLOOD INSURANCE RATE MAP (FIRM) MAP NO. 48201C0845L REVISED/DATED JUNE 18, 2007, THE SUBJECT TRACT APPEARS TO LIE WITHIN UNSHADED ZONE "X", AN AREA DETERMINED TO BE OUTSIDE THE 100-YR AND 500-YR FLOODPLAINS. THIS DETERMINATION WAS DONE BY GRAPHIC PLOTTING AND IS APPROXIMATE ONLY, AND HAS NOT BEEN FIELD VERIFIED. THIS INFORMATION IS INTENDED TO IDENTIFY FLOOD INSURANCE RATES ONLY AND IS NOT INTENDED TO IDENTIFY SPECIFIC FLOODING CONDITIONS.

ADDENDUM 1 4/22/19 0 ISSUE FOR PERMIT 3/12/19 REV **DESCRIPTION** DATE

H2B, INC.

Texas Firm Registration No. 8856

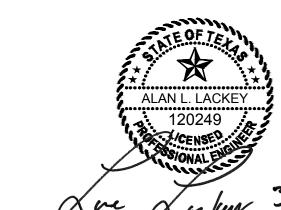
1225 N Loop W, Suite 800

HOUSTON, TX 77008 713.864.2900



HCC BRAYS OAKS PARKING EXPANSION 8855 W BELLFORT BLVD HOUSTON, TX 77031

**COVER SHEET** 



ESIGNED BY: AL DRAWN BY : JS SCALE: AS SHOWN HEET No. 1 OF 17 SHEETS

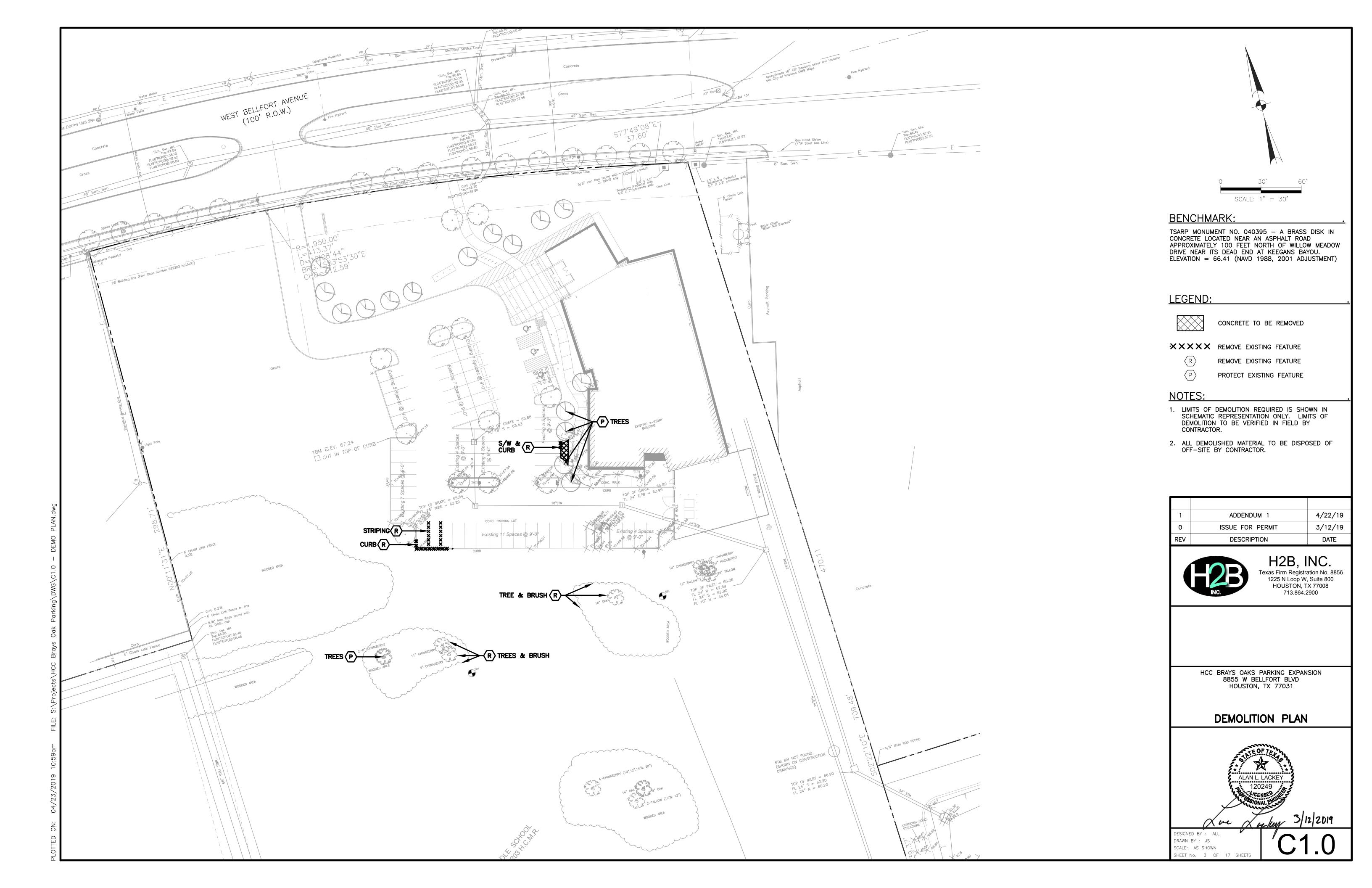
ONE-CALL NOTIFICATION SYSTEM CALL BEFORE YOU DIG!!!

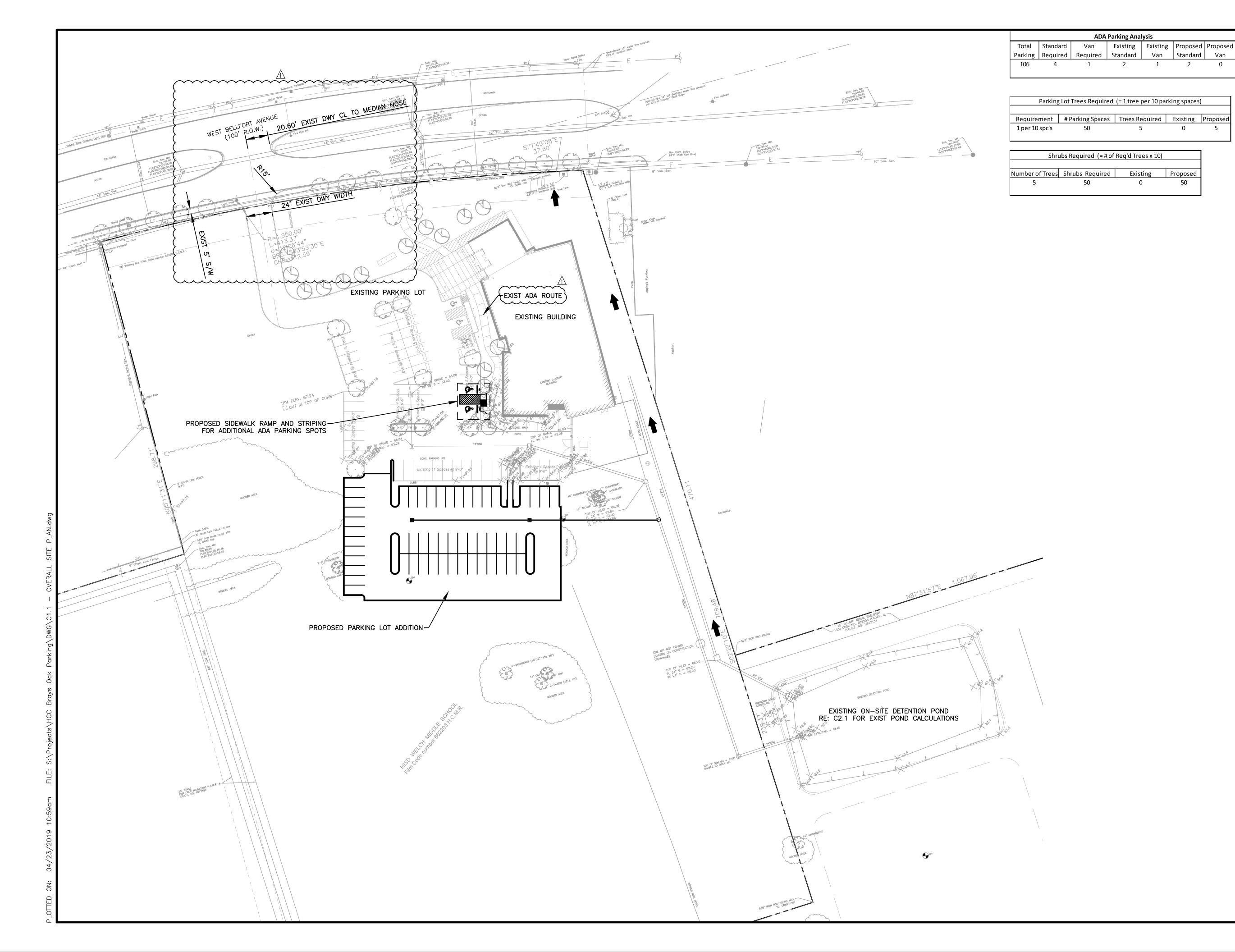
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST - STOP CALL

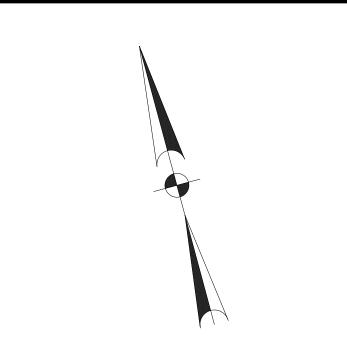
Texas One Call System



1-800-344-8377 (NEW STATEWIDE NUMBER OUTSIDE HOUSTON)







# **BENCHMARK:**

TSARP MONUMENT NO. 040395 — A BRASS DISK IN CONCRETE LOCATED NEAR AN ASPHALT ROAD APPROXIMATELY 100 FEET NORTH OF WILLOW MEADOW DRIVE NEAR ITS DEAD END AT KEEGANS BAYOU. ELEVATION = 66.41 (NAVD 1988, 2001 ADJUSTMENT)

SCALE: 1" = 40'

# **LEGEND:**

— - - — PROPERTY LINE

PROPOSED STORM SEWER EXTREME EVENT OVERFLOW ARROW RE: C2.1

# NOTES:

- TYPICAL PARKING STALL SHALL BE 19-FEET LONG AND 9-FEET WIDE, UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS SHOWN ARE TO FACE OF CURB, UNLESS OTHERWISE NOTED.
- 3. ALL CONCRETE PAVEMENT SHALL BE 6" THICK.
- 4. HYDROMULCH ALL DISTURBED AREAS.
- NO ADDITIONS OR RENOVATIONS ARE PROPOSED TO THE EXISTING BUILDING. THEREFORE, NO NEW PARKING SPACES ARE REQUIRED.

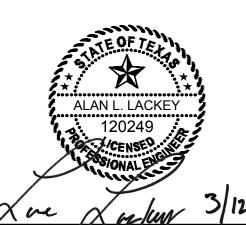
1	ADDENDUM 1	4/22/19
0	ISSUE FOR PERMIT	3/12/19
REV	DESCRIPTION	DATE



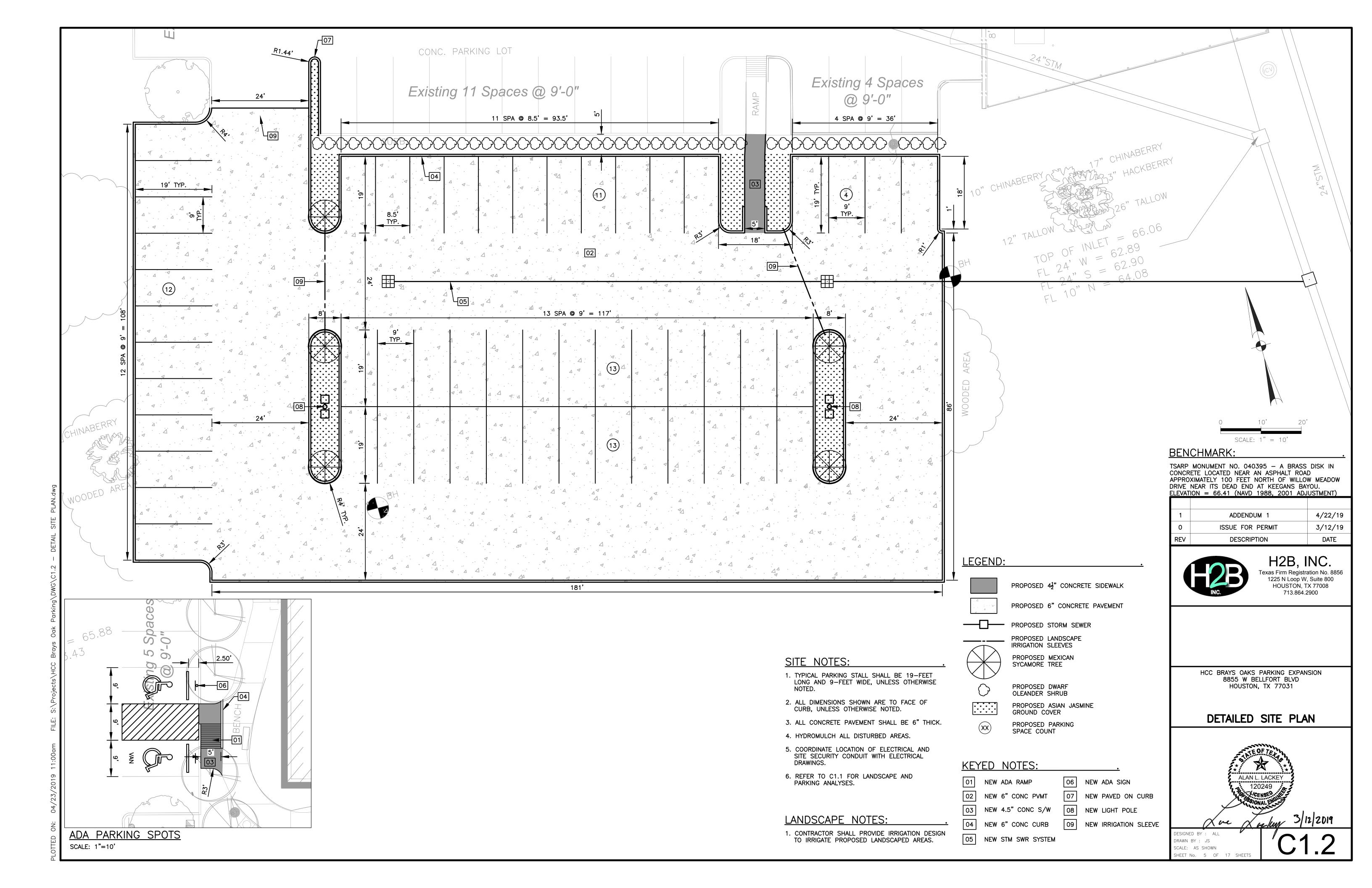
H2B, INC.
Texas Firm Registration No. 8856
1225 N Loop W, Suite 800
HOUSTON, TX 77008
713.864.2900

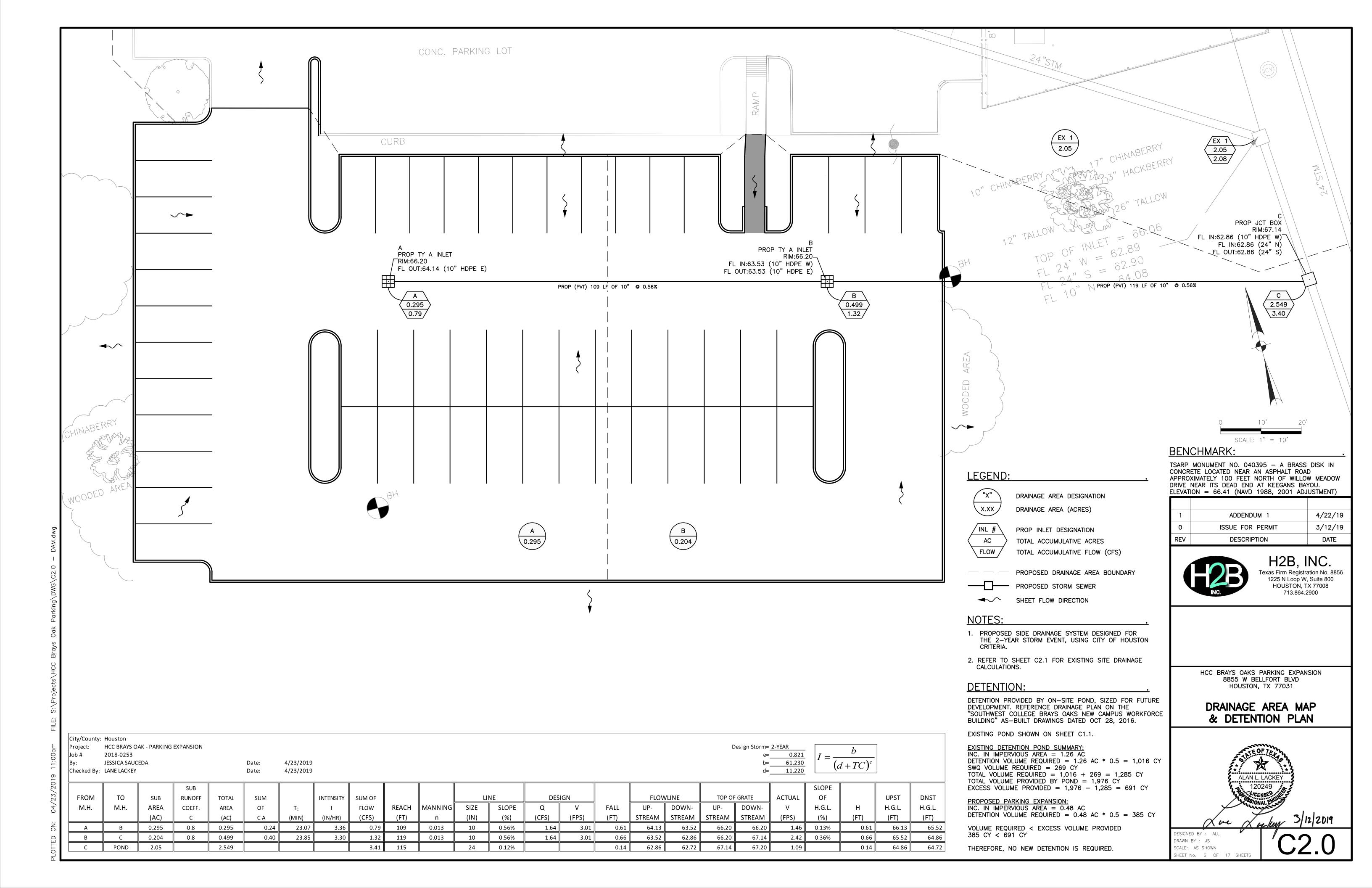
HCC BRAYS OAKS PARKING EXPANSION 8855 W BELLFORT BLVD HOUSTON, TX 77031

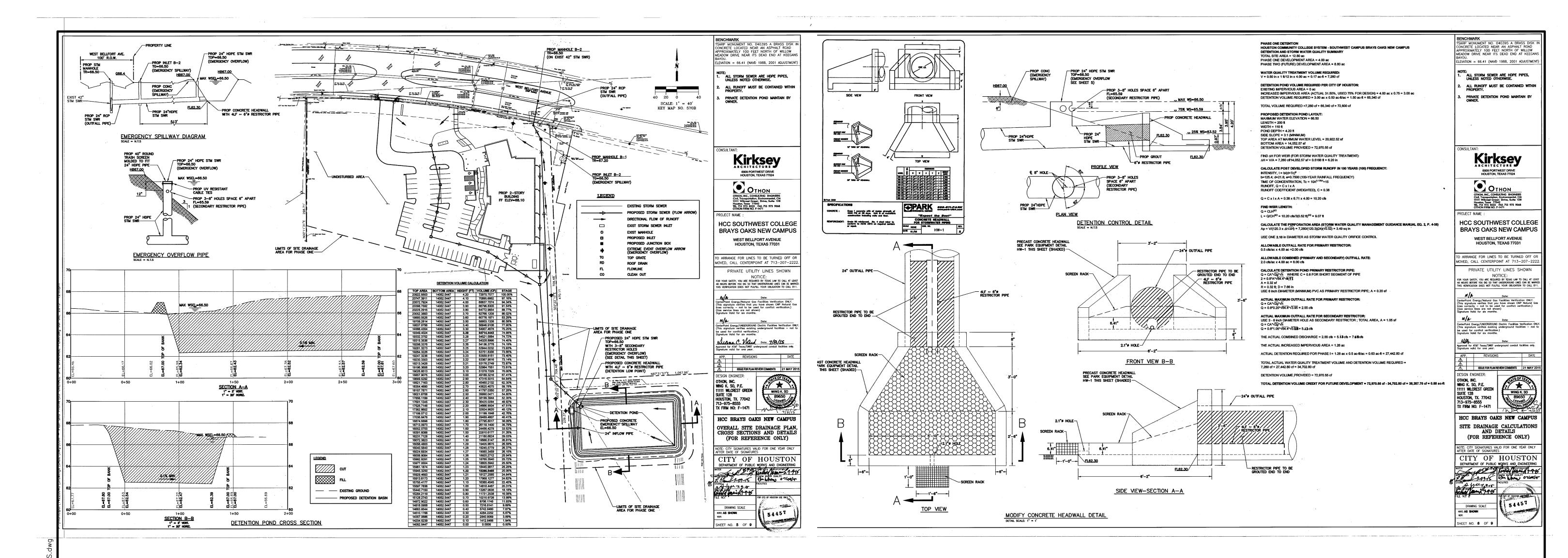
# OVERALL SITE PLAN



DRAWN BY : JS SCALE: AS SHOWN SHEET No. 4 OF 17 SHEETS







1 ADDENDUM 1 4/22/19
0 ISSUE FOR PERMIT 3/12/19
REV DESCRIPTION DATE



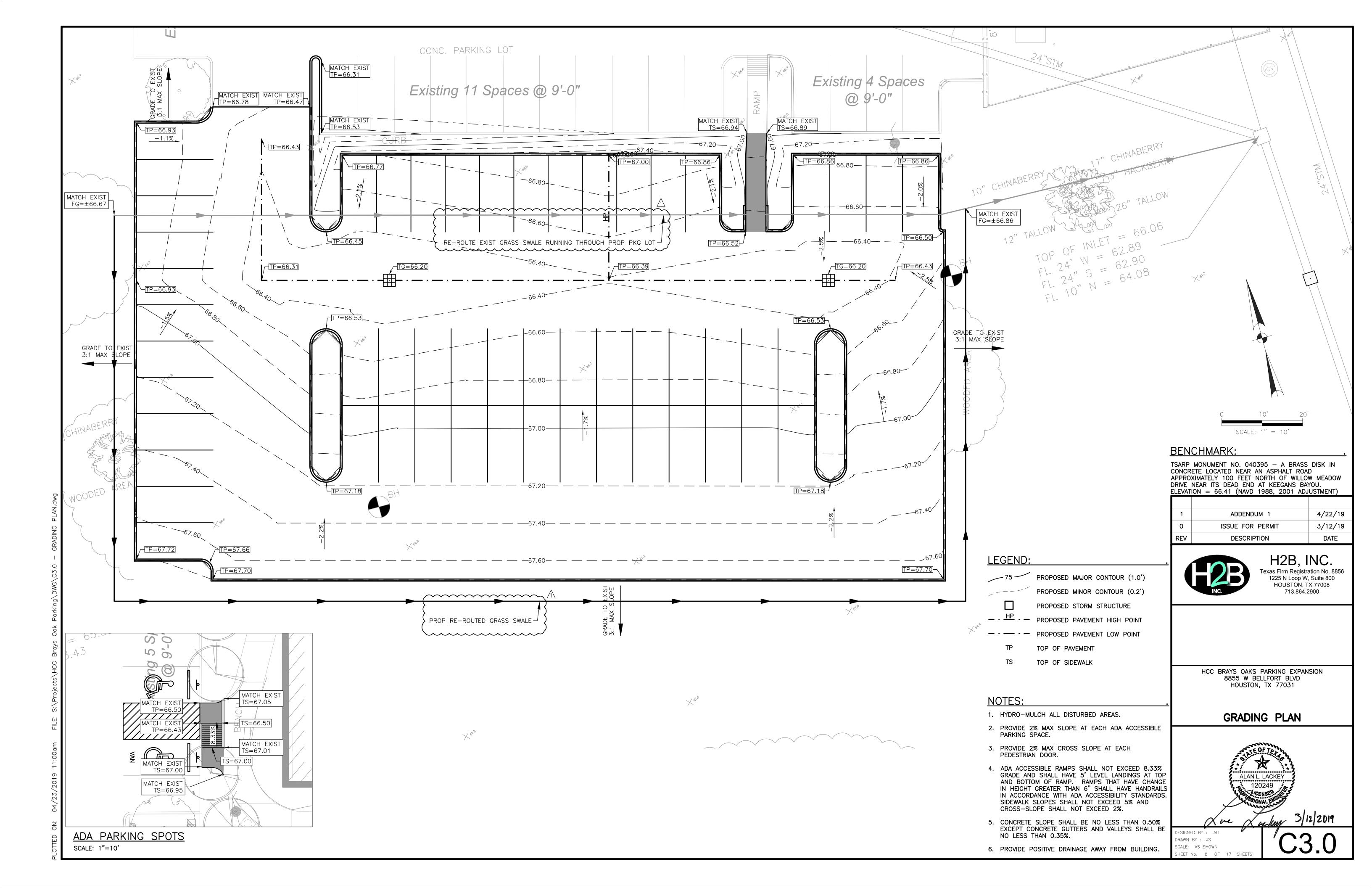
H2B, INC.
Texas Firm Registration No. 8856
1225 N Loop W, Suite 800
HOUSTON, TX 77008
713.864.2900

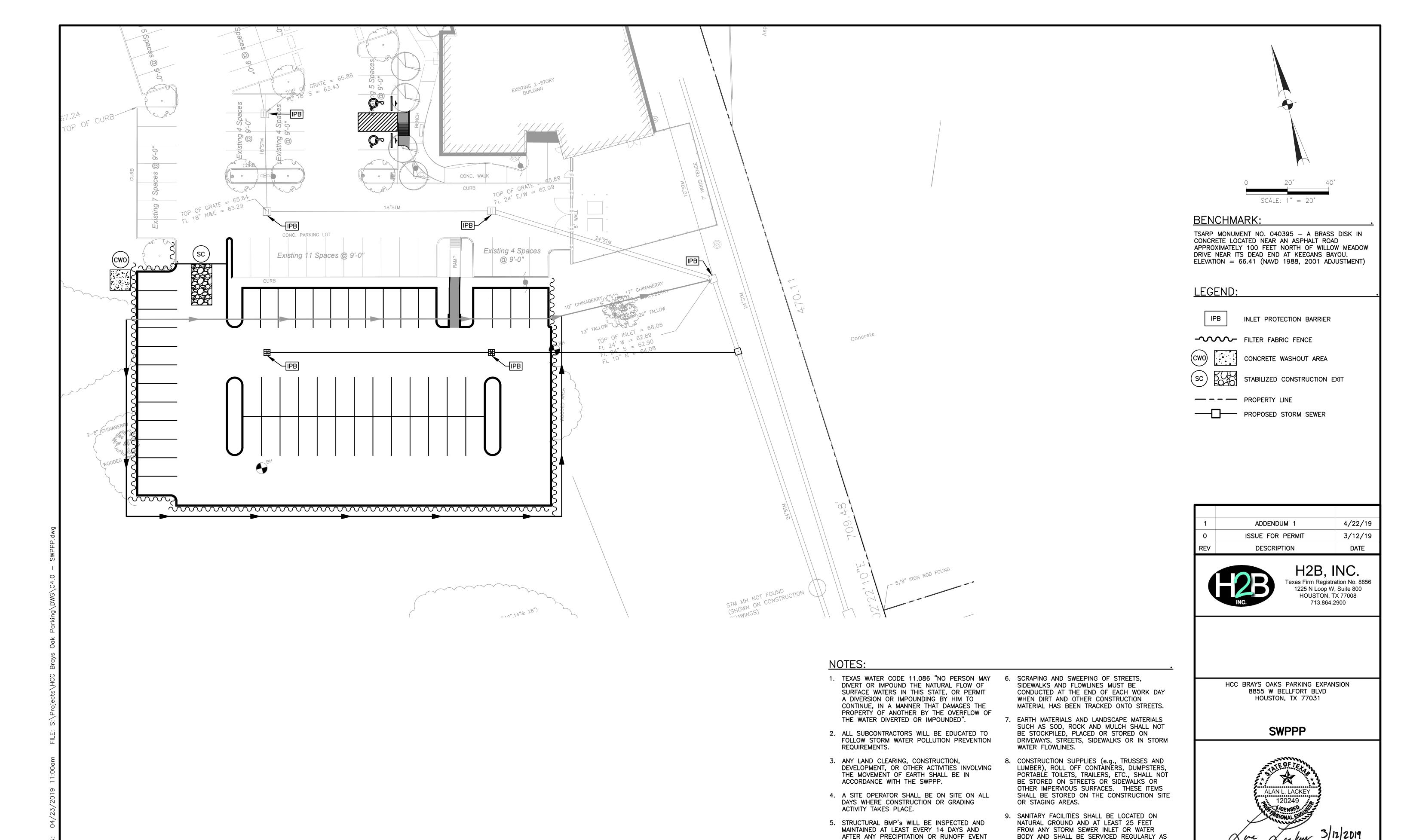
HCC BRAYS OAKS PARKING EXPANSION 8855 W BELLFORT BLVD HOUSTON, TX 77031

FOR REFERENCE ONLY: EXISTING POND DRAWINGS

DESIGNED BY: ALL
DRAWN BY: JS
SCALE: AS SHOWN
SHEET No. 7 OF 17 SHEETS

C2.1





THAT CAUSES SURFACE EROSION, SEDIMENT

TRANSPORT OR VEHICULAR TRACKING.

NEEDED.

HYDROMULCH SEÈDED.

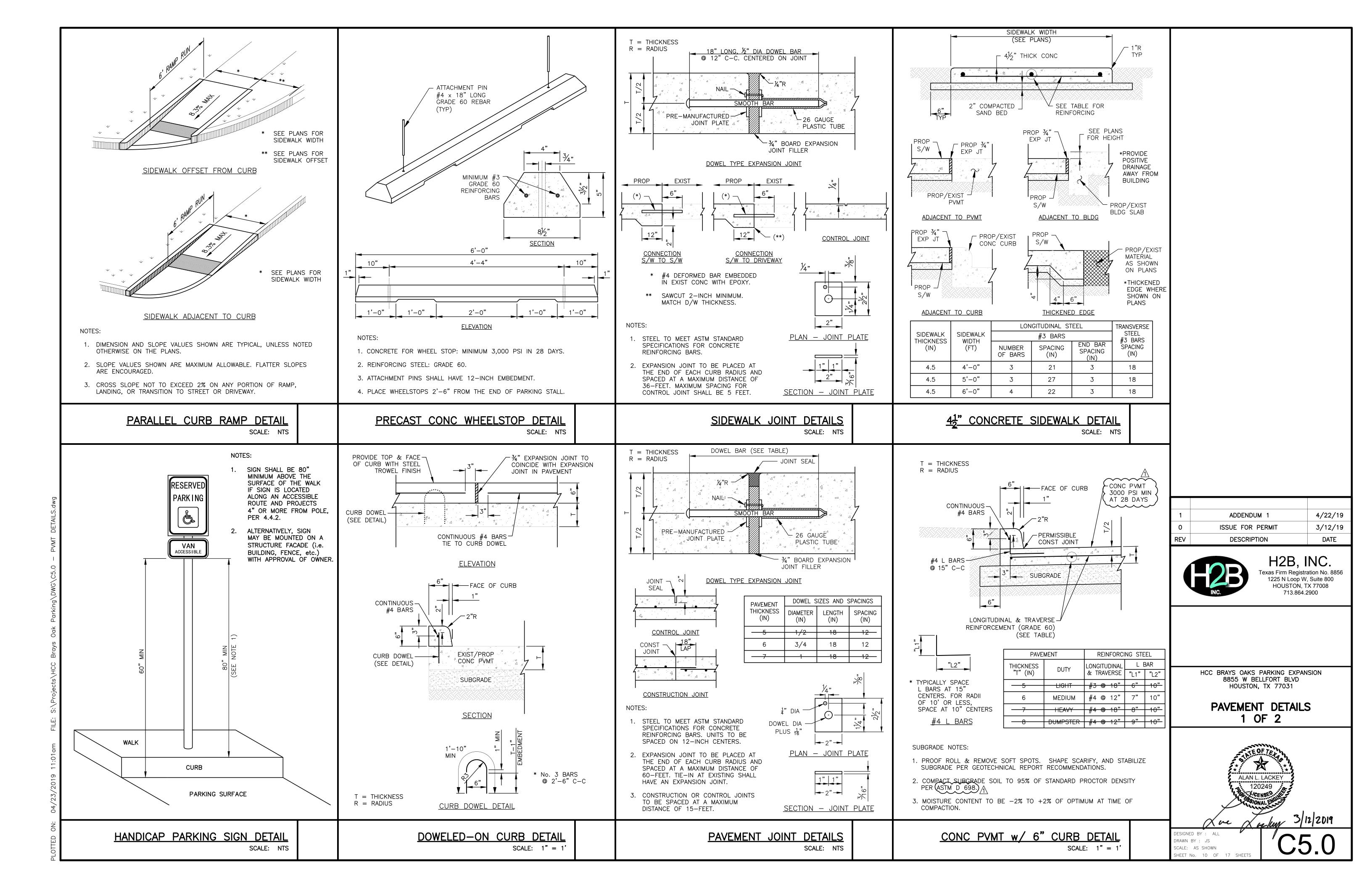
10. ALL DISTURBED (NON PAVED) AREAS SHALL BE

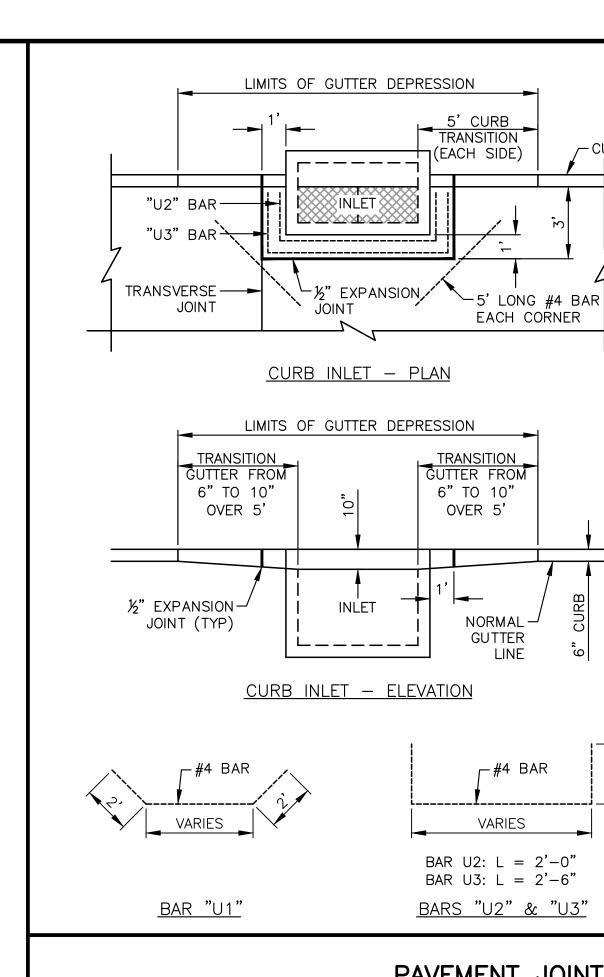
SHEET No. 9 OF 17 SHEETS

DESIGNED BY : ALL

DRAWN BY : JS

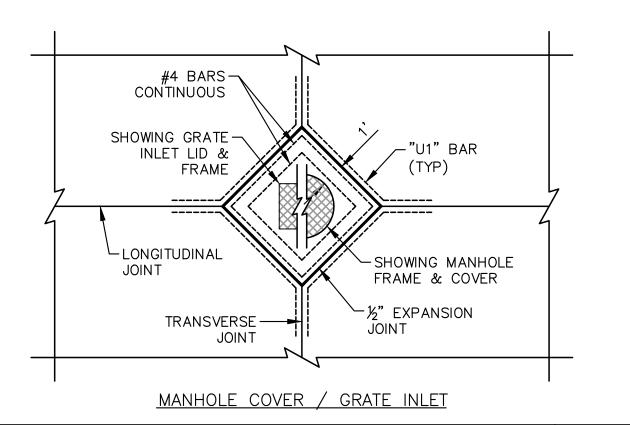
SCALE: AS SHOWN



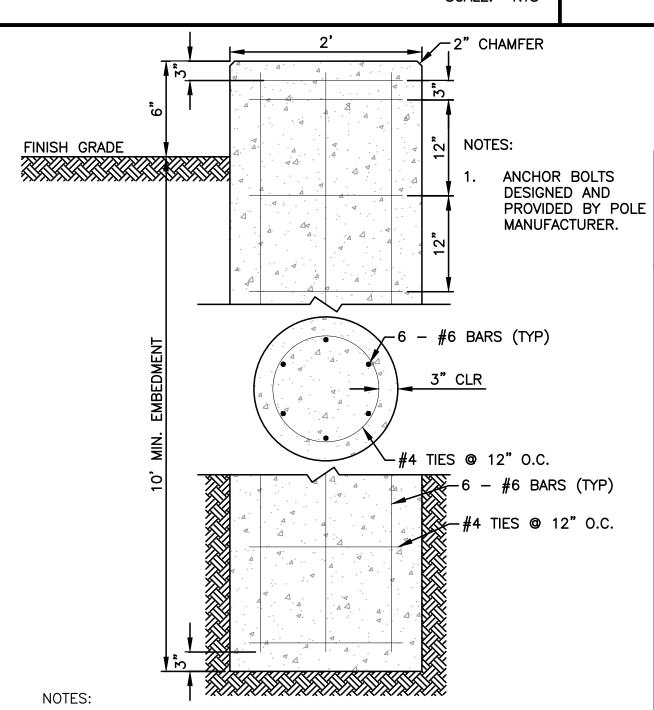


NOTES:

- 1. ISOLATION JOINT TO BE FILLED WITH ELASTOMERIC SEALANT.
- 2. PREFORMED EXPANSION JOINT MATERIAL:
- A. BITUMINOUS FIBER AND BITUMINOUS MASTIC COMPOSITION MATERIAL CONFORMING TO ASTM D994 & ASTM D1751.
- 3. JOINT SEALING COMPOUND OPTIONS:
- A. CONFORM HOT-POURED RUBBER-ASPHALT COMPOUND TO ASTM D3405.
- B. TWO-COMPONENT SYNTHETIC COMPOUND. C. SELF-LEVELING, LOW-MODULUS SILICONE, OR POLYURETHANE SEALANT.
- 4. BOXOUT SHALL BE DOWELED INTO CONCRETE PAVEMENT PER "PAVEMENT JOINT DETAILS" (A 1/2" EXPANSION BOARD SHALL BE USED IN LIEU OF A  $\frac{3}{4}$ " EXPANSION BOARD).
- 5. THROAT OF INLET TO BE DEPRESSED ADDITIONAL 4-INCHES FROM NORMAL GUTTER LINE, FOR A TOTAL 10" GUTTER DEPRESSION FROM TOP OF CURB. TRANSITION GUTTER DEPRESSION OVER 5-FEET.
- 6. LIMITS OF 10-INCH GUTTER DEPRESSION SHALL BE ALONG THE INLET THROAT OPENING. WHEN USING TYPE-C INLETS WITH EXTENSIONS, EXTEND THE 10-INCH DEPRESSION TO INCLUDE THE LENGTH OF THE EXTENSION OPENING.



PAVEMENT JOINT BOXOUT & INLET GUTTER DEPRESSION DETAILS SCALE: NTS



- 1. LIGHT POLE FOUNDATION DESIGNED FOR 30-FOOT TALL POLE CAPABLE OF RESISTING PRESSURES INDUCED BY 3 SECOND GUSTS AT 139 MPH DESIGN WIND SPEED.
- 2. CONCRETE TO HAVE 3,500 PSI MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
- 3. REINFORCING STEEL TO HAVE 60 KSI YIELD STRENGTH.
- 4. MINIMUM HORIZONTAL CLEARANCE FROM ADJACENT FOUNDATIONS SHALL BE NO LESS THAN 18 INCHES.

LIGHT POLE FOUNDATION DETAIL

ADDENDUM 1 4/22/19 ISSUE FOR PERMIT 3/12/19 REV **DESCRIPTION** DATE



713.864.2900

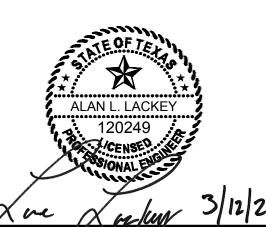
H2B, INC.

Texas Firm Registration No. 8856 1225 N Loop W, Suite 800

HOUSTON, TX 77008

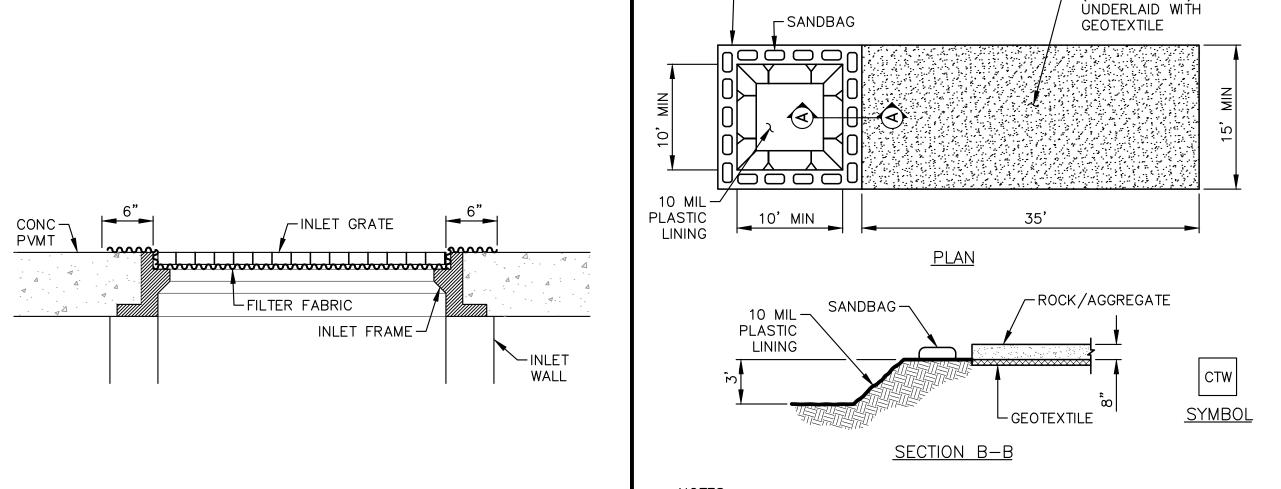
HCC BRAYS OAKS PARKING EXPANSION 8855 W BELLFORT BLVD HOUSTON, TX 77031

> PAVEMENT DETAILS 2 OF 2



DRAWN BY : JS SCALE: AS SHOWN SHEET No. 11 OF 17 SHEETS

SCALE: NTS



-ORANGE SAFETY

FENCE ON THREE

SIDES

- 1. POST A SIGN READING "CONCRETE WASHOUT PIT" NEXT TO THE PIT.
- 2. VERBALLY INSTRUCT THE CONCRETE TRUCK DRIVERS WHERE THE PIT IS AND TO WASHOUT THEIR TRUCKS IN THE PIT AND NOWHERE ELSE.
- 3. UPON THE CONCRETE SETTING UP (CURING, DRYING OUT), THE CONCRETE WASTE SHALL BE REMOVED FROM THE PROJECT SITE AND DISPOSED OF PROPERLY BY THE CONTRACTOR. AFTER REMOVAL OF THE CONCRETE WASTE, THE WASHOUT PIT SHALL BE FILLED WITH CLEAN FILL MATERIAL AND COMPACTED TO IN-SITU CONDITIONS, OR AS DIRECTED BY THE PROJECT SPECIFICATIONS.
- 4. CONCRETE WASHOUT PITS SHALL NOT BE LOCATED DIRECTLY ADJACENT TO, NOR AT ANY TIME DRAIN INTO THE STORM SEWER SYSTEM OR ANY OTHER SWALE, DITCH, OR WATERWAY.
- 5. CONSTRUCT ENTRY ROAD AND BOTTOM OF WASHOUT AREA TO SUPPORT EXPECTED LOADINGS FROM TRUCKS EQUIPMENT.

# 50' MIN ROW 6:1 TYP → EXISTING -GROUND -SEPARATION GEOTEXTIL 8" MIN GRADED TO -FABRIC FOR FULL WIDTH PREVENT RUN-OF AND LENGTH OF EXIT FROM LEAVING SITE <u>PROFILE</u> 50' MIN -PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND PUBLIC CONSTRUCTION RIGHT-OF-WAY WORK ZONE PUBLIC ROW - COARSE AGGREGATE: SC-1 3" TO 5" GRANULAR FILL BULL ROCK <u>SYMBOL</u> (CRUSHED CONCRETE IS PERMITTED)

CAST IRON GRATE CATCH BASIN) —

CB-12 <sup>1</sup>
CB-14
CB-18
CB-20
CB-24
CB-27

SPECIFICATIONS

PRPER CHITEDRANI C-913

Class II concrete with of design strength of 4500 PSI at 28 days. Unit is of monolithic construction at floor and first stage of wall

Cast iron frames and grates are manufactured of grey cast iron conforming to ASTM A48—76 Class 35.

with sectional riser to required depth

REINFORCEMENT: Grade 60 reinforced. Steel rebar conforming to ASTM A615 on required centers or equal.

CATCH BASIN
MFG: PARK ENVIRONMENTAL
888-611-PARK
WWW.PARK-USA.COM
MODEL CB

- 1. MINIMUM LENGTH IS AS SHOWN ON CONSTRUCTION DRAWINGS OR 50 FEET, WHICHEVER IS MORE.
- 2. CONSTRUCT AND MAINTAIN CONSTRUCTION EXIT WITH CONSTANT WIDTH ACROSS ITS LENGTH, INCLUDING ALL POINTS OF INGRESS OR EGRESS.
- 3. UNLESS SHOWN ON THE CONSTRUCTION DRAWINGS, STABILIZATION FOR OTHER AREAS WILL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION EXIT.
- 4. WHEN SHOWN ON THE CONSTRUCTION DRAWINGS, WIDEN OR LENGTHEN STABILIZED AREA TO ACCOMMODATE A TRUCK WASHING AREA. PROVIDE OUTLET SEDIMENT TRAP FOR THE TRUCK WASHING AREA.
- 5. PROVIDE PERIODIC TOP DRESSING WITH ADDITIONAL COARSE AGGREGATE TO MAINTAIN THE REQUIRED DEPTH OR WHEN SURFACE BECOMES PACKED WITH MUD. PERIODICALLY TURN AGGREGATE TO EXPOSE A CLEAN DRIVING SURFACE.

PEDESTRIAN DUTY ST

PRECAST CONCRETE BASIN SECTION

ALL 4 SIDES, SEE KO DIMENSION

.44

PARTIAL SECTION

CBJB36

PARK 888-611-PAR www.park-USA.com

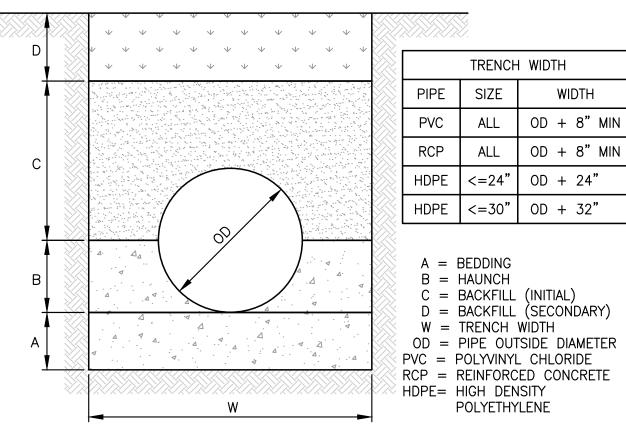
CATCH BASIN MODEL CB — 12" THRU : UNCTION BOX MODEL JB — 12" THRU :

FOR MAXIMUM PIPE O.D.

[TRAFFIC-DUTY OPTIONAL]
(JUNCTION BOX)

MFG: PARK ENVIRONMENTAL 888-611-PARK WWW.PARK-USA.COM

6. MINIMUM 14' WIDTH FOR ONE WAY TRAFFIC AND 20' WIDTH FOR TWO WAY TRAFFIC.



- A) 7" THICKNESS OF CEMENT STABILIZED SAND PLACED BEFORE PIPE IS LAID. SHAPE SAND TO CONFORM TO BOTTOM OF PIPE. MAINTAIN 4" MINIMUM THICKNESS OF SAND BELOW PIPE.
- B) CEMENT STABILIZED SAND PLACED AFTER PIPE IS LAID, TO BE THOROUGHLY RODDED AND BROUGHT TO SPRINGLINE OF PIPE.
- C) FOR HDPE OR PVC PIPE: INITIAL BACKFILL WHEN UNDER OR WITHIN 1' OF PROPOSED PAVING OR SIDEWALK, TO BE CEMENT STABILIZED SAND, THOROUGHLY RODDED, BROUGHT TO 6" ABOVE PIPE.

# C) FOR RCP PIPE:

- IF SECONDARY BACKFILL IS UNDER OR WITHIN 1' OF PROPOSED OR FUTURE PAVING, BACKFILL TO BE SANDY CLAY PLACED IN 8" LOOSE LIFTS AND COMPACTED BY LIFTS TO 95% OF THE STANDARD PROCTOR.
- D) IF SECONDARY BACKFILL IS UNDER OR WITHIN 1' OF PROPOSED OR FUTURE PAVING, BACKFILL TO BE SANDY CLAY PLACED IN 8" LOOSE LIFTS AND COMPACTED BY LIFTS TO 95% OF THE STANDARD PROCTOR. SECONDARY BACKFILL TO BE FILLED NEXT DAY AFTER PIPE INSTALLATION.

# INLET PROTECTION BARRIER SCALE: NTS

2. INLET PROTECTION BARRIERS SHOULD BE PERODICALLY INSPECTED TO ENSURE

POSITIVE DRAINAGE, AND SHOULD BE CLEANED/REPLACED AS NECESSARY.

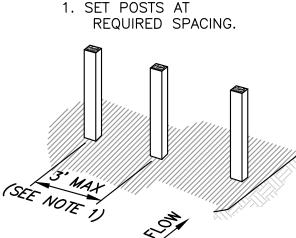
CONCRETE TRUCK WASHOUT AREA SCALE: NTS

-ROCK/AGGREGATE

(8" THICK MIN)

STABILIZED CONSTRUCTION ACCESS SCALE: NTS

STORM BEDDING & BACKFILL DETAIL SCALE: NTS



3. ATTACH FILTER MATERIAL TO

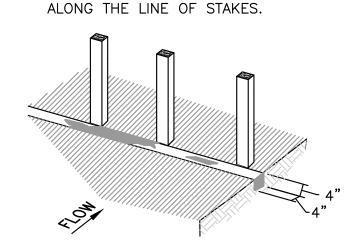
THE TRENCH.

BE INCREASED TO 8 FEET MAX.

AT THE POSTS, AND FOLDED.

STAKES AND EXTEND IT INTO

1. CONTRACTOR TO SECURE FILTER FABRIC TO GRATE.



4. BACKFILL AND COMPACT THE

EXCAVATED SOIL.

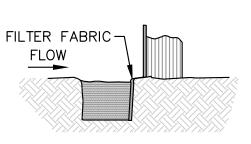
1. 2 INCH THICK BY 2 INCH WOODEN STAKES TO BE SET AT MAX SPACING OF 3 FEET AND EMBEDDED A MIN OF 8 INCHES. IF PREASSEMBLED FENCE WITH SUPPORT NETTING IS USED, SPACING OF POST MAY

2. ATTACH FILTER FABRIC TO WOODEN STAKES. FILTER FABRIC FENCE SHALL HAVE A MIN HEIGHT OF 18

3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHOULD BE OVERLAPPED 6 INCHES

INCHES AND MAX HEIGHT OF 36 INCHES ABOVE NATURAL GROUND.

2. EXCAVATE A 4"x4" TRENCH UPSLOPE

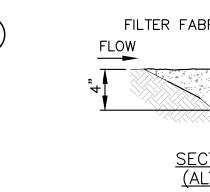


SECTION B-B

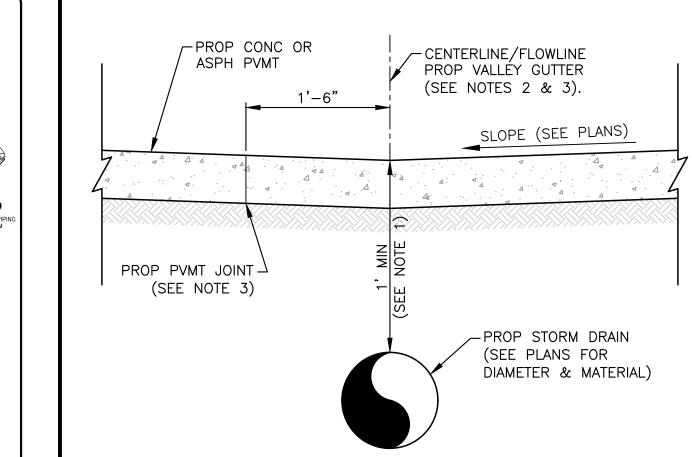
EXTENSION OF FABRIC

INTO TRENCH

ALTERNATE V-TRENCH EXTENSION OF FABRIC INTO TRENCH



SECTION B-B (ALTERNATE)



- MAINTAIN ABSOLUTE MINIMUM 1-FOOT DEPTH OF BURY UNDER PAVEMENT. INSTALL STORM SEWER FLOWLINE AT ELEVATIONS AS INDICATED ON PLANS.
- 2. CONSTRUCT PAVEMENT VALLEY GUTTER AT ELEVATIONS/SLOPES INDICATED ON PLANS. MINIMUM SLOPE SHALL BE 0.50%.
- 3. LOCATE PAVEMENT JOINTS AT MINIMUM OF 18-INCHES FROM VALLEY GUTTER FLOWLINE. DO NOT LOCATE PAVEMENT JOINTS IN VALLEY GUTTER FLOWLINE.
- 4. SEE STORM SEWER BEDDING & BACKFILL DETAIL FOR ADDITIONAL INFORMATION.
- 5. SEE CONCRETE PAVEMENT DETAIL OR ASPHALT PAVEMENT DETAIL FOR ADDITIONAL INFORMATION.

ADDENDUM 1 4/22/19 ISSUE FOR PERMIT 3/12/19 REV DATE **DESCRIPTION** H2B, INC. exas Firm Registration No. 8856

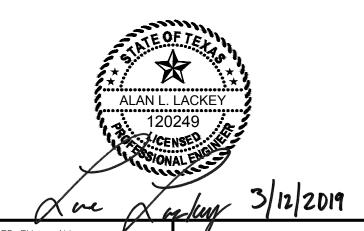
1225 N Loop W, Suite 800

HOUSTON, TX 77008

713.864.2900

HCC BRAYS OAKS PARKING EXPANSION 8855 W BELLFORT BLVD HOUSTON, TX 77031

# STORM SEWER DETAILS



RAWN BY : JS SCALE: AS SHOWN

FILTER FABRIC FENCE DETAILS

INLET (12" THRU 36") DETAIL

17" 20"x20"x1i" 22" 24"x24"x2"

3

VALLEY GUTTER/STORM DRAIN SECTION SCALE: 1" = 1

HEET No. 12 OF 17 SHEETS

# **ELECTRICAL SPECIFICATIONS**

APPLICABLE CODES INCLUDE BUT ARE NOT LIMITED TO: NATIONAL ELECTRICAL CODE (2017 N.E.C.), INTERNATIONAL BLDG CODE 2015, INTERNATIONAL ENERGY CONSERVATION CODE (IECC 2015), LIFE SAFETY CODE (NFPA 101), TEXAS ACCESSIBILITY STANDARDS AMERICANS WITH DISABILITIES ACT OCCUPANCY CLASSIFICATION: B

## 26 05 00 BASIC ELECTRICAL REQUIREMENTS

PERMITS AND CODES: OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND REQUIRED INSPECTIONS. COMPLY WITH ALL NATIONAL, STATE AND MUNICIPAL LAWS, CODES AND ORDINANCES RELATING TO BUILDING AND PUBLIC SAFETY. PROVIDE ANY REQUIRED TEMPORARY POWER AND UTILITIES FOR ALL TRADES AND ALL CONSTRUCTION TRAILERS. PROVIDE TEMPORARY CONSTRUCTION LIGHTING AND POWER. ELECTRICAL CONTRACTOR SHALL INCLUDE TEMPORARY ELECTRIC SERVICE: ALL TEMPORARY ELECTRIC SHALL BE IN ACCORDANCE WITH OSHA CONSTRUCTION STANDARDS 29FCR, PART 1926 AND ARTICLE 305 OF THE NATIONAL FLECTRICAL CODE TEMPORARY LIGHTING AND POWER SHALL BE PROVIDED IN ACCORDANCE WITH OSHA STANDARDS. THE OSHA MINIMUM ILLUMINATION IS 5 FOOTCANDLES IN GENERAL CONSTRUCTION AREAS, AND 10 FC IN MECHANICAL / ELECTRICAL ROOMS AND WORKROOMS. INCLUDED ARE CONNECTIONS TO ALL CONSTRUCTION TRAILERS. THE COST OF THIS WORK IS TO BE INCLUDED IN THE BASE ELECTRICAL BID FOR THE PROJECT

TRENCH SAFETY: SEE SUBCHAPTER C OF CHAPTER 756 OF THE TEXAS HEALTH AND SAFETY CODE FOR REQUIREMENTS APPLICABLE TO TRENCH SAFETY. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ASSURE COMPLIANCE WITH APPLICABLE STATE AND FEDERAL LAWS, AND NO PROVISION OF THESE DRAWINGS OR SPECIFICATIONS SHALL BE DEEMED TO EXCUSE COMPLIANCE WITH APPLICABLE STATE AND FEDERAL REQUIREMENTS FOR TRENCH SAFETY.

VISITING THE JOB SITE: VISIT THE SITE OF THE PROPOSED CONSTRUCTION IN ORDER TO FULLY UNDERSTAND THE FACILITIES, DIFFICULTIES AND RESTRICTIONS ATTENDING THE EXECUTION OF THE WORK. NO ADDITIONAL COMPENSATION WILL BE ALLOWED THIS CONTRACTOR FOR WORK OR ITEMS OMITTED FROM HIS ORIGINAL PROPOSAL DUE TO HIS FAILURE TO INFORM HIMSELF REGARDING SUCH MATTERS AFFECTING THE PERFORMANCE OF THE WORK IN THIS CONTRACT OR NECESSARY FOR THE INSTALLATION AND COMPLETION OF THE WORK INCLUDED HEREIN.

DRAWINGS: DRAWINGS ARE DIAGRAMMATIC, CONFIRM DIMENSIONS & LOCATIONS IN THE FIELD. IF CONFLICTING DIMENSIONS ARE SHOWN, USE LARGER DIMENSIONS AND VERIFY WITH ARCHITECT. SEE ARCHITECTURAL PLANS AND ELEVATIONS FOR EXACT LOCATION OF FIXTURES AND WALL MOUNTED DEVICES.

MATERIAL: ALL MATERIALS SHALL BE NEW, MADE IN USA AND U.L. LISTED. MATERIAL INSTALLATION SHALL COMPLY WITH NEC REQUIREMENTS AND PERFORM BY CRAFTSMAN SKILLED IN THIS PARTICULAR WORK.

**EQUIPMENT PROTECTION: PROTECT EQUIPMENT AND WORK FROM DAMAGE DURING HANDLING AND INSTALLATION UNTIL** COMPLETION OF CONSTRUCTION.

COOPERATION WITH OTHER TRADES: COOPERATION WITH TRADES OF ADJACENT, RELATED OR AFFECTED MATERIALS OR OPERATIONS, AND WITH TRADES PERFORMING CONTINUATIONS OF THIS WORK UNDER SUBSEQUENT CONTRACTS, IS CONSIDERED A PART OF THIS WORK IN ORDER TO EFFECT TIMELY AND ACCURATE PLACING OF WORK AND TO BRING TOGETHER, IN PROPER AND CORRECT SEQUENCE, THE WORK OF SUCH TRADES. PROVIDE OTHER TRADES, AS REQUIRED, ALL NECESSARY TEMPLATES, PATTERNS, SETTING PLANS AND SHOP DETAILS FOR THE PROPER INSTALLATION OF THE WORK AND FOR THE PURPOSE OF COORDINATING ADJACENT WORK. ELECTRICAL POWER CONNECTIONS FOR MECHANICAL AND PLUMBING EQUIPMENT ARE IN THIS DIVISION UNLESS NOTED OTHERWISE. VERIFY CHARACTERISTICS OF ALL EQUIPMENT WITH DIVISION 15 AND OTHER SPECIAL DIVISIONS (ELEVATORS ETC) BEFORE ROUGHING IN THE ELECTRICAL CONNECTIONS AND ENERGIZING THE EQUIPMENT. MECH/PLUMBING/SPECIAL EQPT ACCESS AND CLEARANCE AREAS: REMOVE ANY IMPROPERLY INSTALLED ELECTRICAL EQPT AND CONDUIT THAT ARE LIMITING PROPER ACCESS FOR EQPT SERVICE AND MAINTENANCE.

ACCESS PANEL: PROVIDE ACCESS PANELS OR DOORS FOR ALL DEVICES REQUIRING ADJUSTMENT. SIMILARLY FOR ALL JUNCTION BOXES, PULL BOXES ETC THAT ARE REQUIRED TO BE ACCESSIBLE PER CODE AND/OR THE LOCAL AUTHORITY HAVING JURISDICTION. APPEARANCE OF ACCESS PANELS/DOORS SHALL BE ACCEPTABLE TO ARCHITECT. PANELS/DOORS SHALL BE DESIGNED FOR THE FIRE RATING OF WALL OR CEILING IN WHICH THEY ARE INSTALLED. ALL ACCESS PANELS SHALL BE LOCKABLE AND SHALL BE KEYED ALIKE (SAME KEYING AS PANELS FROM OTHER DIVISIONS)

PLENUMS: PLENUMS ARE CROWDED AND NOT ALL OBSTACLES ARE INDICATED. ALLOW FOR CONDUIT OFFSETS AND PULL BOXES NOT INDICATED ON DRAWINGS.

PLASTER, GYPSUM BOARD OR OTHER NON-ACCESSIBLE CEILINGS: CONTRACTOR SHALL MINIMIZE CUTTING AND PATCHING BY INSTALLING CONDUIT PRIOR TO CEILING/WALL/PARTITION COVER-UP.

# LOSS OR DAMAGE TO EXISTING FACILITIES:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOSS OR DAMAGE TO THE EXISTING FACILITIES CAUSED BY HIM AND HIS WORKMEN, AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING SUCH LOSS OR DAMAGE. THE CONTRACTOR SHALL SEND PROPER NOTICES, MAKE NECESSARY ARRANGEMENTS, AND PERFORM OTHER SERVICES REQUIRED FOR THE CARE, PROTECTION AND IN-SERVICE MAINTENANCE OF ALL ELECTRICAL SERVICES FOR THE <NEW AND EXISTING> FACILITIES. THE CONTRACTOR SHALL ERECT TEMPORARY BARRICADES, WITH NECESSARY SAFETY DEVICES, AS REQUIRED TO PROTECT PERSONNEL AND THE GENERAL PUBLIC FROM INJURY, REMOVING ALL SUCH TEMPORARY PROTECTION UPON COMPLETION OF

THE CONTRACTOR SHALL MODIFY, REMOVE AND/OR REPLACE ALL MATERIALS AND ITEMS SO INDICATED ON THE DRAWINGS OR REQUIRED BY THE INSTALLATION OF NEW FACILITIES. SALVAGE MATERIALS SHALL REMAIN THE PROPERTY OF THE OWNER AND SHALL BE DELIVERED TO SUCH DESTINATION AS DIRECTED BY THE OWNER. DISPOSE OF SALVAGE MATERIAL IF NOT RETAINED

WHERE EXISTING CONSTRUCTION IS REMOVED TO PROVIDE WORKING AND EXTENSION ACCESS TO EXISTING UTILITIES, CONTRACTOR SHALL REMOVE CEILING GRID, TILES, DOORS, PIPING, AIR CONDITIONING DUCTWORK AND EQUIPMENT, ETC., TO PROVIDE THIS ACCESS AND SHALL REINSTALL SAME UPON COMPLETION OF WORK IN THE AREAS AFFECTED.

WORK IN OCCUPIED AREAS: WORK IN, ABOVE, BELOW OR NEAR OCCUPIED AREAS SHALL BE AT OWNER'S CONVENIENCE AND MAY BE DURING EVENINGS OR WEEKENDS. SCHEDULE ALL REQUIRED POWER OUTAGES A MINIMUM OF 7 DAYS IN ADVANCE WITH FACILITY ENGINEER/OWNER. DO NOT TURN OFF ANY POWER SOURCES. ONLY FACILITY ENGINEER/OWNER OR HIS AUTHORIZED REPRESENTATIVE MAY DO SO

ELECTRICAL SERVICE OUTAGE: SERVICE TO THE EXISTING BUILDING SHALL BE MAINTAINED DURING NORMAL WORKING HOURS. ANY SERVICE OUTAGE REQUIRED TO COMPLETE THE WORK SHALL BE THE TIME AND FOR THE LENGTH OF TIME AS DIRECTED BY THE OWNER. ALL PREMIUM TIME SHALL BE INCLUDED IN CONTRACTOR'S BID.

FIRE STOPS AND PENETRATION SEALS: ALL PENETRATIONS THROUGH FIRE RATED FLOORS AND WALLS SHALL BE SEALED WITH 3M FIRE RESISTANT FOAM SEALANT. TO PREVENT THE SPREAD OF SMOKE, FIRE, TOXIC GAS OR WATER THROUGH THE PENETRATION EITHER BEFORE, DURING OR AFTER A FIRE, THE FIRE RATING OF THE PENETRATION SEAL SHALL BE AT LEAST THAT OF THE FLOOR OR WALL INTO WHICH IT IS INSTALLED. SO THAT THE ORIGINAL FIRE RATING OF THE FLOOR OR WALL IS

CLEAN UP: A) PROVIDE FOR ISOLATION OF WORK AREAS AND DAILY REMOVAL OF DEBRIS. B) CLEAN ALL EQUIPMENT AND FIXTURE LENSES. C) REPLACE ALL BURNED OUT LAMPS. D) TOUCH UP WITH PAINT WHERE REQUIRED.

MAINTAINED AS REQUIRED BY ARTICLE 300.21 OF THE NATIONAL ELECTRICAL CODE.

SUBMITTAL DATA: SUBMITTALS ARE REQUIRED BUT NOT LIMITED TO THE FOLLOWING EQUIPMENT: LIGHTING FIXTURES; SWITCHGEAR; MCCS; DISTRIBUTION; PANELBOARDS; BRANCH CIRCUIT PANELBOARDS; TRANSFORMERS; SWITCHES ETC; EMERGENCY STANDBY GENERATOR SYSTEM; FIRE ALARM SYSTEM; NURSE CALL; SYSTEM; SECURITY SYSTEM; TELEPHONE SYSTEM; COMMUNICATION SYSTEM; CONDUIT/FITTINGS; WIRES; LIGHTNING PROTECTION SYSTEM

SHOP DRAWINGS: SHOP DRAWINGS AS REQUIRED SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR AT NO ADDITIONAL COST TO THE ARCHITECT. THESE SHOP DRAWINGS SHALL BE PREPARED TO INDICATE INSTALLATION OF MAJOR EQUIPMENT WHERE SPECIAL COORDINATION PROBLEM EXIST

OVERCURRENT & SAFETY DISCONNECT DEVICES FOR HVAC EQPT: OVERCURRENT (OC) & DISCONNECT DEVICES SHOWN ON PLANS ARE BASED ON A SPECIFIC HVAC EQUIPMENT MANUFACTURER. HVAC CONTRACTOR MAY SUBMIT OTHER MANUFACTURERS DIFFERENT MODELS OR RATINGS IT IS THE RESPONSIBILITY OF THE FLECTRICAL CONTRACTOR TO COORDINATE OC/DISCONNECT DEVICES WITH THE HVAC CONTRACTOR PRIOR TO SUBMITTING SUCH DEVICES FOR ENGINEER'S REVIEW. ANY DEVIATIONS FROM SIZES SHOWN ON DRAWINGS MUST BE NOTED IN THE SUBMITTALS. THE ELECTRICAL CONTRACTOR MUST CERTIFY THAT HE HAS REVIEWED AND COORDINATED WITH THE HVAC CONTRACTOR AND THAT ALL OC/DISCONNECT DEVICES SUBMITTED MATCH THE HVAC EQPT REQUIREMENTS. SHOP DRAWINGS WITHOUT SUCH CERTIFICATION WILL BE RETURNED TO THE CONTRACTOR. ONLY SUBMITTALS WITH SUCH CERTIFICATION WILL BE REVIEWED.

# COMPLETE SYSTEMS: ALL SYSTEMS SHALL BE COMPLETE AND WORKING AT COMPLETION OF CONSTRUCTION.

FINAL INSPECTION & OPERATING TESTS: ALL ELECTRICAL SYSTEMS MUST BE CHECKED FOR PROPER POLARITY AND SEQUENCE. ALL MOTORS MUST BE CHECKED FOR PROPER ROTATION AND ALL EQUIPMENT (INCLUDING HVAC, ELEVATOR AND SPECIAL EQUIPMENT) CHECKED FOR PROPER VOLTAGE AND PHASING REQUIREMENTS. PRIOR TO THE APPLICATION OF ANY POWER. THE CONTRACTOR MUST CERTIFY THAT ALL CONNECTED EQUIPMENT MATCH THE CHARACTERISTICS OF THE SUPPLY CIRCUIT VOLTAGE, PHASING AND FEEDER REQUIREMENTS.

AT THE TIME DESIGNATED BY THE ARCHITECT, THE ENTIRE SYSTEM SHALL BE INSPECTED BY THE ARCHITECT AND THE ENGINEER. THE CONTRACTOR OR HIS REPRESENTATIVE SHALL BE PRESENT AT THIS INSPECTION. AFTER ALL SYSTEMS HAVE BEEN COMPLETED AND PUT INTO OPERATION, SUBJECT EACH SYSTEM TO AN OPERATING TEST UNDER DESIGN CONDITIONS TO ENSURE PROPER SEQUENCE AND OPERATION THROUGHOUT THE RANGE OF OPERATION, MAKE ADJUSTMENTS AS REQUIRED TO ENSURE PROPER FUNCTIONING OF ALL SYSTEMS. SPECIAL TESTS ON INDIVIDUAL SYSTEMS ARE SPECIFIED UNDER INDIVIDUAL SECTIONS. THE CONTRACTOR SHALL PROVIDE A SET OF AS-BUILT DRAWINGS AND MYLAR REPRODUCIBLES TO THE OWNER/ARCH. AFTER

THE INSPECTION. ANY ITEMS WHICH ARE NOTED AS NEEDING TO BE CHANGED OR CORRECTED IN ORDER TO COMPLY WITH THESE SPECIFICATIONS AND THE DRAWINGS SHALL BE ACCOMPLISHED WITHOUT DELAY.

**GUARANTEE**: GUARANTEE ALL WORK AND MATERIALS FURNISHED UNDER THIS CONTRACT FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER AND ARCHITECT. GUARANTEE SHALL INCLUDE: ALL LABOR, PARTS, TRAVEL/SUBSISTENCE, SOFTWARE CHANGES/RE-PROGRAMMING, ETC.

RECORD DRAWINGS: MAINTAIN A CONTINUOUS DAILY RECORD DURING THE COURSE OF CONSTRUCTION OF ALL CHANGES AND DEVIATIONS IN THE WORK FROM THE ACCOMPANYING DRAWINGS. SHOW EXACT DIMENSIONS FOR ALL UNDER-SLAB CONDUIT. UPON COMPLETION OF WORK, PURCHASE A SET OF MYLAR REPRODUCIBLES AND MAKE CORRECTIONS AS REQUIRED TO REFLECT THE ELECTRICAL SYSTEMS AS INSTALLED. SUBMIT THREE PRINTS OF THE TRACINGS FOR APPROVAL, MAKE CORRECTIONS TO TRACINGS AS DIRECTED AND DELIVER MYLAR TRACINGS TO THE OWNER.

# 26 05 73 SHORT CIRCUIT CALCULATION, PROTECTIVE DEVICE COORDINATION AND ARC FLASH STUDIES

PROVIDE SHORT CIRCUIT CALCULATION, PROTECTIVE DEVICE COORDINATION AND ARC FLASH HAZARD STUDIES. STUDIES SHALL ENCOMPASS ELECTRICAL DISTRIBUTION SYSTEM FROM NORMAL POWER SOURCE OR SOURCES TO AND INCLUDING {BRANCH BREAKERS IN EACH PANELBOARD). PREPARE STUDY PRIOR TO ORDERING DISTRIBUTION EQUIPMENT TO VERIFY EQUIPMENT RATINGS REQUIRED. PERFORM STUDY WITH AID OF COMPUTER SOFTWARE PROGRAMS. REPORT SHALL INCLUDE: (A) CALCULATION METHODS AND ASSUMPTIONS, (B) ONE LINE DIAGRAM, (C) STATE CONCLUSIONS AND RECOMMENDATIONS

ARC FLASH HAZARD ANALYSIS SHALL NOT BE REQUIRED FOR EQUIPMENT RATED 240 VOLTS OR LESS AND SUPPLIED BY ONE TRANSFORMER RATED LESS THAN 125 KVA. CONTRACTOR SHALL PROVIDE WARNING LABELS ON ELECTRICAL EQUIPMENT INDICATING INCIDENT ENERGY LEVEL, LEVEL OF HAZARD AND THE REQUIRED PERSONAL PROTECTION EQUIPMENT. EQUIPMENT SHALL INCLUDE, BUT NOT LIMITED TO, SWITCHBOARDS, DISTRIBUTION PANELS, MOTOR CONTROL CENTERS, PANELS, CONTACTORS, DISCONNECT SWITCHES AND

26 05 33 CONDUIT AND BOXES CONDUIT: SHALL BE RIGID GALVANIZED STEEL (RGS) OR ELECTRICAL METALLIC TUBING (EMT) AS MANUFACTURED BY ALLIED, TRIANGI F OR WHEATI AND

OUTDOORS ABOVE GRADE, STUB-UPS, OR ON ROOF: RGS OR IMC BELOW GRADE: SCHEDULE 40 OR 80 PVC OR RGS. PROVIDE TRANSITION FITTINGS FROM PVC SCH 40 OR 80 TO RGS FOR ALL ABOVE GRADE CONDUIT. ALL UNDERGROUND METALLIC CONDUIT SHALL HAVE 40-MIL THICK EXTERNAL PVC COATING FOR CORROSION PROTECTION. UNDERGROUND CONDUIT MINIMUM SIZE 3/4". MINIMUM 24" BURIAL DEPTH FROM FINISHED GRADE TO TOP OF CONDUIT, PROVIDE DEEPER BURIAL DEPTH IF REQUIRED BY LOCAL CODES. PROVIDE CONCRETE ENCASEMENT FOR ALL INCOMING SERVICE CONDUIT UNLESS SPECIFICALLY NOTED OTHERWISE. PROVIDE RED DETECTABLE WARNING TAPE OVER ENTIRE RUN OF SERVICE AND MAJOR CONDUIT RUNS

UNDER SLAB: RGS OR SCHEDULE 80 PVC INSTALL GROUND WIRES WHERE SHOWN ON THE DRAWINGS. COMPRESSION OR SET-SCREW TYPE FITTINGS MAY BE USED FOR EMT. MINIMUM CONDUIT SIZE 3/4 INCH, EXCEPT THAT DROPS TO SWITCHES MAY BE 1/2". TYPE "MC" METAL CLAD CABLE IS ACCEPTABLE IF APPROVED BY THE LOCAL AUTHORITY. MC CABLE, IF APPROVED, HOWEVER, MAY BE USED ONLY FOR DROPS FROM CEILING PLENUM JUNCTION BOXES TO LIGHT FIXTURES AND RECEPTACLES & LIGHT SWITCHES IN WALLS. MC CABLE MAY BE USED AS FIXTURE WHIPS FROM CEILING PLENUM JUNCTION BOXES TO LIGHT FIXTURES, WHIPS MUST BE 6-FT OR LESS. HOMERUN CIRCUITS TO PANELS SHALL BE IN CONDUIT, MC HOMERUN TO PANELS IS NOT ACCEPTABLE. TYPE "AC" ARMORED CABLE (COMMONLY REFERRED TO AS "BX") IS NOT ACCEPTABLE AND SHALL NOT BE USED. FLECTRICAL NONMETALLIC TUBING (ENT, N.E.C. ARTICLE 362) SHALL NOT BE USED UNLESS SPECIFICALLY APPROVED BY THE ENGINEER. FLEXIBLE CONDUIT SHALL BE UTILIZED AS FINAL CONNECTIONS (3'-5' ONLY) AT THE FOLLOWING EQUIPMENT: MOTORS, LIGHTING FIXTURES, HEATER. POWER SUPPLIES, AND ANY OTHER VIBRATION PRODUCING EQUIPMENT. UTILIZE 1/2" FLEXIBLE METALLIC CONDUIT MINIMUM AND INCLUDE A GREEN GROUND WIRE. USE SEALTITE IN WET LOCATIONS SUCH AS OUTDOOR CONDENSING UNITS, WALK-IN COOLER/ FREEZER, KITCHEN, ROOFTOP HVAC EQPT ETC. CONDUIT SHALL BE SUPPORTED FROM STRUCTURE EVERY 5 FEET AND WITHIN 3 FEET OF ALL BOXES. USE LOCKNUTS INSIDE AND OUT AT BOXES. MAINTAIN MINIMUM 12" SEPARATION FROM ALL HIGH TEMPERATURE PIPES. ALL CONDUIT RUNS SHALL BE INSTALLED EITHER PARALLEL OR PERPENDICULAR TO BUILDING LINES. ROUTE CNDUIT AS DIRECTLY AS POSSIBLE WITH LARGEST RADIUS BENDS POSSIBLE. MAKE BENDS WITH STANDARD ELLS OR BENDS PER NEC. PROVIDE EXPANSIONS FITTINGS IF CONDUIT CROSSES STRUCTURAL EXPANSION JOINT. ALL CONDUIT ON ROOF SHALL BE SUPPORTED BY AN ENGINEERED, PREFABRICATED PORTABLE PIPE SYSTEM SPECIFICALLY DESIGNED TO BE INSTALLED ON THE ROOF WITHOUT ROOF PENETRATIONS, FLASHING OR DAMAGE TO THE ROOF MEMBRANE PROVIDE PIPE SUPPORT SYSTEM BY ERICO, MODEL "CADDY PYRAMID" OR EQUAL BY COOPER B-LINE. SUPPORT AT INTERVAL NOT TO EXCEED 10' ON CENTER. AND WITHIN 5' OF ANY DEFLECTION OF CONDUIT. CONDUIT ON ROOF SHALL BE SUPPORTED ON 4"X4" REDWOOD SLEEPER AT 10-FOOT INTERVAL. CLEAN CONDUIT INTERIOR AFTER INSTALLATION; COAT SCRATCHES WITH ZINC PAINT. PROVIDE PULL WIRE IN ALL CONDUIT (POWER, FIRE ALARM, TELEPHONE AND OTHER COMMUNICATION CONDUIT).

PULL WIRE ALSO REQUIRED IN ALL SPARE CONDUIT.
PROJECT RECORD DOCUMENTS: ACCURATELY RECORD ACTUAL ROUTING OF ALL UNDERSLAB AND UNDERGROUND CONDUITS; INCLUDE DIMENSIONS FROM KEY BUILDING POINTS AND DEPTH OF COVER.

OUTLET BOXES: SHALL BE GALVANIZED STEEL SUITABLE FOR LOCATION. CEILING OUTLET BOXES SHALL BE 4" OCTAGON. WALL OUTLET BOXES SHALL BE PROPER DESIGN TO ACCOMMODATE THE DEVICES REQUIRED - 4 INCH SQUARE WITH RAISED COVER. PROVIDE RACO, STEEL CITY OR APPLETON. ALL J-BOXES / SPLICE BOXES MUST BE ACCESSIBLE.

JUNCTION /PULL BOXES: (A) FOR EACH CONDUIT RUN: PROVIDE ONE JUNCTION/PULL BOX FOR EACH EQUIVALENT THREE QUARTER BENDS (270°). (B) UNDERGROUND FEEDERS: MINIMUM ONE PULL BOX FOR EACH 350 FEET OF CONDUIT RUN.

## 26 05 19 BUILDING WIRE AND CABLE WIRE: (TRIANGLE, AMERICAN INSULATED CABLE CO., OR CABLEC)

INDOORS ABOVE GRADE: FMT OR RGS

ALL WIRING SHALL BE IN CONDUIT (EXCEPT PLENUM RATED LOW VOLTAGE CABLES). ALL WIRES MUST BE 75-DEGREE C RATED OR BETTER, 60-DEGREE C RATED WIRE SHALL NOT BE USED. 90-DEGREE C RATED WIRE MAY BE USED BUT ONLY AT <u>5-DEGREE C AMPACITY.</u> EMERGENCY AND NORMAL CIRCUITS MUST BE INSTALLED IN SEPARATE CONDUIT AND DEVICE OXES PER N.E.C. ARTICLE 700.9.(B).

A.) MINIMUM SIZE #12 EXCEPT CONTROLS MAY BE #14. USE #10 CONDUCTORS FOR 20 AMPERE, 120 VOLT BRANCH CIRCUITS LÓNGER THAN 100 FEET. USE #10 CONDUCTORS FOR 20 AMPERE, 277 VOLT BRANCH CIRCUITS LONGER THAN 200 FEET. B.) TYPE THHN/THWN STRANDED COPPER THERMOPLASTIC IN DRY LOCATIONS.

C.) TYPE THWN IN WET LOCATIONS (OUTDOOR, UNDERGROUND, ON ROOF, ETC...). D.) ALL WIRE SHALL BE 98% CONDUCTIVITY COPPER. 600 VOLT. NO ALUMINUM WIRES

E.) WIRE #10 AND SMALLER MAY BE SOLID OR STRANDED, #8 OR LARGER SHALL BE STRANDED

F.) COMMUNICATION WIRE (FIRE ALARM, TELEPHONE, HVAC THERMOSTAT, DATA ETC.): PLENUM RATED LOW-SMOKE CABLE MAY BE USED IN LIEU OF WIRE/CONDUIT TYPE INSTALLATION. ALL PLENUM RATED CABLE SHALL BE PROPERLY SUPPORTED BY BRIDAL RINGS, CABLE TIES, CLIPS ETC MADE BY ERICO (CADDY COMMUNICATION FASTENERS) OR EQUAL. DO NOT USE SCRAP WIRE TO WRAP AND SUPPORT COMMUNICATION WIRES. HOMEMADE SUPPORT DEVICES ARE NOT ACCEPTABLE. DO NOT LAY COMMUNICATION CABLE DIRECTLY ON TOP OF CEILING TILES, INSTALL CABLES A MINIMUM OF 12" ABOVE CEILING TILES AND 12" FROM HVAC DUCTWORK. PROVIDE A MINIMUM OF 6" SEPARATION BETWEEN POWER CONDUIT AND COMMUNICATION WIRINGS.

FIELD INSULATION TESTING: INSULATION RESISTANCE OF ALL CONDUCTORS SHALL BE TESTED. EACH CONDUCTOR SHALL HAVE ITS INSULATION RESISTANCE TESTED AFTER THE INSTALLATION IS COMPLETED AND ALL SPLICES, TAPS AND CONNECTIONS ARE MADE EXCEPT CONNECTION TO OR INTO ITS SOURCE AND POINT (OR POINTS) OF TERMINATION. INSULATION RESISTANCE OF CONDUCTORS WHICH ARE TO OPERATE AT 600 VOLTS OR LESS SHALL BE TESTED BY USING A BIDDLE MEGGER OF NOT LESS THAN 1000 VOLTS DC. INSULATION RESISTANCE OF CONDUCTORS RATED AT 600 VOLTS SHALL BE FREE OF SHORTS AND GROUNDS AND HAVE A MINIMUM RESISTANCE PHASE-TO-PHASE AND PHASE-TO-GROUND OF AT LEAST 10 MEGOHMS. CONDUCTORS THAT DO NOT EXCEED INSULATION RESISTANCE VALUES LISTED ABOVE SHALL BE REMOVED AT CONTRACTOR'S EXPENSE AND REPLACED AND TEST REPEATED. THE CONTRACTOR SHALL FURNISH AL INSTRUMENTS AND PERSONNEL REQUIRED FOR TESTS, SHALL TABULATE READINGS OBSERVED, AND SHALL FORWARD COPIES OF THE TEST READINGS TO THE OWNER. THESE TESTS REPORTS SHALL IDENTIFY EACH CONDUCTOR TESTED, DATE AND TIME OF TEST AND WEATHER CONDITIONS. EACH TEST SHALL BE SIGNED BY THE PARTY MAKING THE TEST.

WIRING DEVICES: FURNISH AND INSTALL WHERE INDICATED ON DRAWINGS. MATCH EXISTING OR BASE BUILDING DEVICES IF APPLICABLE. ALL DEVICES SHALL BE LEVITON "DECORA" TYPE (WHITE COLOR, CONFIRM W/ARCHITECT) OR APPROVED EQUAL UNLESS SPECIFIED OTHERWISE BY ARCHITECT. ALL RECEPTACLES SHALL BE FED SPEC TYPE. TOGGLE LIGHT SWITCHES AND COVER PLATES ON EMERGENCY POWER SHALL BE RED COLOR. EMERGENCY POWER OUTLETS AND COVER DIMMER SWITCHES: PROVIDE DEDICATED NEUTRAL FOR DIMMER CONTROLLED LIGHTING CIRCUIT. DO NOT SHARE NEUTRAL WITH 2 OR MORE BRANCH CIRCUITS. DO NOT BREAK FINS (HEAT SINKS) ON DIMMER SWITCH. DERATED DIMMER SWITCHES MAY BE USED ONLY WHERE SPECIFICALLY APPROVED BY ENGINEER. GROUND FAULT CIRCUIT INTERRUPTER (GFCI) RECEPTACLE SHALL COMPLY WITH 2006 UL 943 SAFETY STANDARD. GFCI RECEPTACLE SHALL HAVE INTEGRAL END-OF-LIFE LED INDICATOR LIGHT. AND CONTINUOUS SENSING AND SELF-TESTING

EVERY 60 SECONDS, PROVIDE HUBBELL GER5352 OR APPROVED FOLIAL ISOLATED POWER RECEPTACLES (IF USED) TO BE ORANGE COLOR, WITH CIRCUIT NUMBER AND PANEL NAME ENGRAVED ON COVER PLATES: HIGH ABUSE NYLON OR STAINLESS STEEL PER ARCHITECT. PROVIDE CIRCUIT NUMBER LABEL ON ALL DEVICE

ALL ELECTRICAL BOXES ON OPPOSITE SIDES OF CORRIDOR WALLS AND FIREWALLS MUST BE SEPARATED BY A HORIZONTAL DISTANCE OF NOT LESS THAN 24 INCHES.

TESTING AND CERTIFICATION: CONTRACTOR SHALL DELIVER A WRITTEN REPORT CERTIFYING THAT EVERY RECEPTACLE HAS BEEN TESTED AS FOLLOWS AND FOUND ACCEPTABLE: (A) THE PHYSICAL INTEGRITY OF EACH RECEPTACLE SHALL BE CONFIRMED BY VISUAL INSPECTION (B) THE CONTINUITY OF THE GROUNDING CIRCUIT IN EACH FLECTRICAL RECEPTACLE SHALL BE VERIFIED. (C) CORRECT POLARITY OF THE HOT AND NEUTRAL CONNECTIONS IN EACH ELECTRICAL RECEPTACLE SHALL BE CONFIRMED. (D) THE RETENTION FORCE OF THE GROUNDING BLADE OF EACH ELECTRICAL RECEPTACLE (EXCEPT LOCKING-TYPE RECEPTÀCLES) SHALL BE NOT LESS THAN 115 GRAMS (4 OZ.).

# 26 05 26 GROUNDING AND BONDING

GROUNDING: ALL CONDUIT WORK AND ELECTRICAL EQUIPMENT SHALL BE EFFECTIVELY AND PERMANENTLY GROUNDED IN ACCORDANCE WITH NEC REQUIREMENTS. PROVIDE GREEN EQUIPMENT GROUNDING CONDUCTOR WITH ALL POWER AND RECEPTACLE AND LIGHTING CIRCUITS. GREEN EQUIPMENT GROUNDING CONDUCTOR SHALL BE ROUTED FROM PANEL GROUND BUS TO FINAL DEVICES GROUNDING ELECTRODES: PROVIDE 3/4" X 10-FT LONG, COPPER-CLAD, STEEL GROUNDING ROD, FOR BELOW-GRADE CONNECTIONS PROVIDE EXOTHERMIC WELDED TYPE; FOR ABOVE GRADE CONNECTIONS PROVIDE MECHANICAL BOLTED-TYPE

CONNECTIONS UTILIZING HIGH CONDUCTIVE COPPER ALLOY OR BRONZE LUGS OR CLAMPS. SERVICE GROUND RESISTANCE:

MUST BE LESS THAN 25 OHMS. PROVIDE ADDITIONAL GROUND RODS AS REQUIRED TO OBTAIN 25 OHMS OR LESS.

# 26 05 53 ELECTRICAL IDENTIFICATION

IDENTIFICATION: LABEL ALL JUNCTION AND PULL BOXES WITH PANELS AND CIRCUIT NUMBERS. ALL JUNCTION AND PULL BOXES IN CEILING PLENUM SHALL BE PAINTED YELLOW FOR 480 VOLT HIGH VOLTAGE SYSTEM: BLUE FOR LOW VOLTAGE SYSTEM (240 VOLT AND/OR 208 VOLT). FURNISH MARKERS OR PAINT BAND FOR EACH CONDUIT LONGER THAN 6 FEET. SPACING 20 FEET ON CENTER. COLOR OF PAINT BAND (CONFIRM COLOR MATCHES EXISTING COLOR CODE.): (A) 480 VOLT SYSTEM - BLACK, (B) 208 VOLT SYSTEM - BLACK W/BLUE STRIPES, (C) FIRE ALARM SYSTEM - RED, (D) TELEPHONE SYSTEM -YELLOW, (E) OTHER SYSTEM - BY SPECIFIC LETTER DESCRIPTION. LABEL ALL HOMERUN AND MAJOR CONDUIT WITH HOME PANELS/SWITCHES ETC. AT EVERY 10-FT. INTERVAL IF ACCESSIBLE AND/OR VISIBLE, EXAMPLE: PANEL "X", SW. "X", COND UNIT XXX, XFMR DISC, SW., X-RAY FEEDER XXX, ETC, MARK ALL BRANCH CONDUIT WITH CIRCUIT NUMBERS AT EACH SURFACE MOUNTED PANEL LOCATION. FOR RECESSED PANELS, MARK BRANCH CONDUIT IN CEILING PLENUM JUST ABOVE PANELS. COLOR CODE: CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS (FOLLOW LOCAL AHJ OR EXISTING COLOR CODES IF APPLICABLE):

	480Y/277V 3PH/4W	208Y/120V 3PH/4W	240/120V 3PH/4W	120/240V 1PH/3W
PHASE A	BROWN	BLACK	BLACK	BLACK
PHASE B	PURPLE	RED	ORANGE (HIGH LEG)	RED
PHASE C	YELLOW	BLUE	BLUE	BLUE
NEUTRAL	GRAY OR WHITE	WHITE	WHITE	WHITE
GROUND	GREEN	GREEN	GREEN	GREEN

ALL PANELS SHALL BE IDENTIFIED USING NAMEPLATES WITH 4 ROWS OF TEXT (LETTER HEIGHT SHALL BE 1/4" MINIMUM), EXAMPLE: PANEL "XX". SECTION # 1 OF 2-SECT PNL

## 225 AMPS BUS, 150A MCB, 208Y/120V FED FROM DIST PANEL "XXX". 1ST FLOOR

FEEDER SIZE 4 # 1/0 THWN, 1 # 6 G, 2 1/2"C.

PANEL NAMEPLATES SHALL BE ENGRAVED THREE-LAYER LAMINATED PLASTIC, WHITE LETTERS ON BLACK BACKGROUND FOR NORMAL POWER, RED LETTER/BLACK BACKGROUND FOR EMERGENCY POWER. SECURE NAMEPLATES TO EQUIPMENT USING SCREWS OR RIVETS. IN ADDITION TO THE 4 ROWS OF TEXT, ALL EMERGENCY POWER PANELS SHALL BE IDENTIFIED AS TO THE BRANCHES THEY SERVE. PROVIDE LABELS "EMERGENCY LIFE SAFETY BRANCH", "EMERGENCY CRITICAL BRANCH" AND "EMERGENCY EQUIPMENT BRANCH" FOR ALL EMERGENCY PANELS, USE RED LETTER ON BLACK BACKGROUND FOR ALL EMERGENCY PANELS, LETTER HEIGHT SHALL BE 1/4" MINIMUM. ALL SWITCHES. STARTERS. COMBINATION STARTERS / DISCONNECTS. TRANSFORMERS. WIREWAYS. COMMUNICATION CABINETS, JUNCTION AND PULL BOXES ETC SHALL BE SIMILARLY IDENTIFIED. PROVIDE LABEL FOR EACH BRANCH CIRCUIT ON DISTRIBUTION PANELS, SWITCHBOARDS AND MCC'S.

208V. 3 PHASE. 3 WIRE

FEEDER SIZE 3 # 4/0 THWN, 1 # 4 G, 2 1/2"C. FED FROM DIST PANEL "XXX", 1ST FLOOR

# ALL EMERGENCY PANELS, JUNCTION BOXES WITH EMERGENCY CIRCUITS, ETC. SHALL BE PAINTED RED.

# 33 71 73 ELECTRICAL SERVICE

CONTRACTOR SHALL MAKE ARRANGEMENTS FOR TEMPORARY AND PERMANENT SERVICE. COMPLY WITH ALL SERVICE INSTALLATION STANDARDS OF THE SERVING UTILITY. ELECTRICAL SERVICE CHARACTERISTICS SHALL BE AS SHOWN ON THE ELECTRICAL ONE LINE DIAGRAM. CONTRACTOR SHALL COORDINATE LOCATION OF SERVICE ENTRANCE WITH THE POWER COMPANY, PROVIDE MATERIALS AND EQUIPMENT REQUIRED TO CONNECT THE PROJECT SERVICE TO THE UTILITY SYSTEM. CONTRACTOR SHALL SUBMIT TO THE POWER COMPANY AN APPLICATION FOR SERVICE. CONTRACTOR SHALL SUBMIT SERVICE APPLICATION TO THE POWER COMPANY WITHIN 30 DAYS AFTER AWARD OF PROJECT CONTRACT. CONTRACTOR SHALL SECURE A SERVICE OUTLET AND DATA STATEMENT ("STATEMENT") FROM THE POWER COMPANY. VERIFY THAT THE INFORMATION ON THE STATEMENT IS CORRECT, INCLUDING VOLTAGE, PHASE AND NUMBER OF WIRES, TYPES OF SERVICE, SERVICE FACILITY ARRANGEMENTS, AND LOCATION OF SERVICE OUTLET. PROVIDE A COPY OF THE STATEMENT FOR ENGINEER'S REVIEW. FAILURE TO SUBMIT SERVICE APPLICATION IN A TIMELY MANNER MAY CAUSE PROJECT DELAY AND ADDITIONAL COST, ALL SUCH COST DUE TO CONTRACTOR'S FAILURE TO APPLY AND COORDINATE FOR SERVICE IN A TIMELY MANNER SHALL BE BORNE BY THE CONTRACTOR. CONTRACTOR SHALL COORDINATE AND ASSIST OWNER IF APPLICATION IS REQUIRED TO BE SUBMITTED BY OWNER. OUTAGES: SCHEDULE POWER OUTAGES TO AVOID INTERFERENCE WITH THE OWNER'S ACTIVITIES. OBTAIN APPROVAL FROM OWNER AT LEAST 30 DAYS PRIOR TO THE REQUESTED OUTAGES. IF REQUIRED BY THE OWNER, PROVIDE A SCHEDULE SHOWING SEQUENCE AND DURATION OF ALL ACTIVITIES DURING THE REQUESTED OUTAGES.

# 26 24 13 DISTRIBUTION SWITCHBOARDS

ALL EQUIPMENT SHALL HAVE COPPER BUSES OR WINDINGS. PROVIDE SWITCHBOARD WHICH PERMITS ACCESS TO BUSES AND DEVICES FOR INSTALLATION AND FUTURE MAINTENANCE FROM THE FRONT BACK AND SIDES

BUSES: SHALL BE 98% IACS CONDUCTIVITY, TIN- OR SILVER-PLATED COPPER WITH ROUNDED EDGES. DETERMINE CURRENT RATING FOR SECTION BUS AND BRANCH BUS ON THE BASIS OF SERVICE TO ALL DEVICES INCLUDING SPARES AND SPACES FOR FUTURE ADDITION. SIZE SECTION BUS A MINIMUM OF 60 PERCENT OF THE MAIN BUS RATING. IN EACH SWITCHBOARD SECTION INCLUDE AN UNINSULATED NEUTRAL BUS ON INSULATED BUS SUPPORTS SECURED TO THE SECTION FRAME AND BOLT TO NEUTRAL BUS BARS IN ADJACENT SECTIONS, THUS PROVIDING A CONTINUOUS NEUTRAL BUS. IN EACH SWITCHBOARD SECTION INCLUDE AN UNINSULATED COPPER GROUND BUS BAR FOR THE EQUIPMENT. SECURE THE BAR TO THE UNIT FRAME AND BOLT TO THE GROUND BUS BARS IN ADJACENT SECTIONS, THUS PROVIDING A CONTINUOUS EQUIPMENT GROUND BUS. INCLUDE TERMINATIONS AT THE BUS BAR FOR FEEDER AND BRANCH CIRCUIT GROUNDING CONDUCTORS. THE TERMINATIONS MUST BE EXOTHERMICALLY WELDED ON OR BE OF AN APPROVED PRESSURE CONNECTOR TYPE. MAKE AREA OF GROUND BUS NOT LESS THAN ¼ X 2 SQUARE INCHES. EXTEND ALL BUSES THE ENTIRE LENGTH OF THE SWITCHBOARD. BUSES MUST HAVE THE REQUIRED CAPACITY FOR THEIR TOTAL LENGTH. MAKE PROVISIONS FOR EXTENSIONS FROM EITHER END OF BUSES. MAIN AND BRANCH CIRCUIT PROTECTIVE DEVICES: SEE DRAWINGS FOR SIZE, ALL DEVICES SHALL BE 100% RATED. METERING: EQUIP THE SWITCHBOARD WITH AMMETERS, VOLTMETERS AND DEMAND METERS.

GROUND-FAULT PROTECTION: PROVIDE GROUND FAULT PROTECTION ON CIRCUIT PROTECTIVE DEVICES WHERE INDICATED ON THE DRAWINGS. THE UNIT SHALL INCLUDE COORDINATED CURRENT SENSORS, SOLID STATE RELAY AND MONITOR PANEL OF THE SAME MANUFACTURER. CURRENT SENSORS -PROVIDE GROUND-FAULT PROTECTION AS AN INTEGRAL PART OF THE CIRCUIT PROTECTIVE DEVICE. A RESIDUAL SCHEME SHALL BE USED WHICH INCORPORATES AN ADDITIONAL CURRENT TRANSFORMER WHICH WILL MONITOR THE

SUBMITTALS: SUBMIT DIMENSIONED DRAWINGS OF THE SWITCHBOARD, INCLUDING TOP AND BOTTOM VIEWS SHOWING ENTRY AND EXIT SPACE FOR CONDUITS AND BUSWAYS, FRONT AND SIDE ELEVATIONS SHOWING ARRANGEMENT OF ALL DEVICES AND ALSO INCLUDE DIMENSIONAL DATA ON ALL BUSES INCLUDING MATERIAL TYPE AND CAPACITY OF THE BUSES. SUBMIT ONE LINE DIAGRAMS FOR EQUIPMENT BEING PROVIDED. ALSO SUBMIT INFORMATION ON ALL PROTECTIVE DEVICES INCLUDING TYPE RATINGS AND SETTINGS OF ALL TRIPS PROVIDED TO INCLUDE GROUND FAULT RELAY SETTINGS. PROVIDE COORDINATION STUDY OF ALL PROTECTIVE DEVICES. PROVIDE COORDINATION CURVES ON LOG-LOG PAPER FOR THE MAIN PROTECTIVE DEVICE AND FOR THE LARGEST BRANCH CIRCUIT DEVICES. THESE CURVES SHALL ALSO SHOW THE GROUND FAULT PROTECTIVE RELAY.

TESTING: AFTER INSTALLATION AND BEFORE ACCEPTANCE BY THE OWNER, THE CONTRACTOR SHALL PROVIDE THE SERVICES OF AN INDEPENDENT TESTING ORGANIZATION SUCH AS GENERAL ELECTRIC INSTALLATION AND SERVICE ENGINEERING. TESTCO OR WESTINGHOUSE ENGINEERING SERVICES TO PERFORMANCE TEST ALL GROUND FAULT RELAYS IN ACCORDANCE WITH NEC PARAGRAPH 230.95. THIS TEST SHALL INVOLVE PASSING A PRIMARY CURRENT THROUGH THE CURRENT SENSOR WITH A SUITABLE. LOW-VOLTAGE TEST SET AND TIMER, WHICH SHALL ALLOW VERIFICATION THAT THE GROUND FAULT RELAYS TRACK THEIR PUBLISHED CURVES AND THAT THEY ACTUALLY TRIP THE DEVICES ON WHICH THEY ARE APPLIED. THIS TEST SHALL ALSO INCLUDE THE POLARITY OF THE CURRENT SENSORS AND GIVE AN INDICATION OF SATISFACTORY OPERATION OF VOLTMETERS, AMMETERS AND THEIR SELECTOR SWITCHES. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER OF THIS TEST DATE 2 DAYS IN ADVANCE SO THAT TESTS CAN BE PROPERLY

ACCEPTABLE MANUFACTURERS ARE GE, SQUARE D, EATON/CUTLER-HAMMER, AND SIEMENS. MATCH EXISTING WHERE REQUIRED BY OWNER.

# **26 24 16 PANELBOARDS**

ALL PANELBOARDS SHALL HAVE COPPER BUSES. LOAD CENTER TYPE PANELBOARDS ARE NOT ACCEPTABLE AND SHALL NOT BE USED. PROVIDE BREAKERS WHICH ARE QUICK-MAKE AND QUICK-BREAK ON BOTH MANUAL AND AUTOMATIC OPERATION. USE A TRIP-FREE BREAKER WHICH IS TRIP INDICATING. INCORPORATE INVERSE TIME CHARACTERISTICS BY BIMETALLIC OVERLOAD ELEMENTS AND INSTANTANEOUS CHARACTERISTICS BY MAGNETIC TRIP. FOR 2-POLE AND 3-POLE BREAKERS, USE THE COMMON-TRIP TYPE SO THAT AN OVERLOAD OR FAULT ON ONE POLE WILL TRIP ALL POLES SIMULTANEOUSLY. HANDLE TIES ARE NOT ACCEPTABLE. ALL BREAKERS SHALL BE BOLT-ON THERMAL MAGNETIC TYPE. STAB-ON BREAKERS ARE NOT ACCEPTABLE. DO NOT USE TANDEM CIRCUIT BREAKERS. ALL CIRCUIT BREAKERS RATED 100 AMP OR LESS SHALL BE SUITABLE FOR TERMINATING 75-DEGREE C WIRE (BREAKERS RATED FOR ONLY 60-DEGREE C WIRE IS NOT ACCEPTABLE. SEE SECTION 16123 – BUILDING WIRE AND CABLE). ALL EQUIPMENT SHALL BE LABELED, PANELBOARDS SHALL BE LABELED BOTH ON THE COVERPLATES AND THE INTERIORS. ALL

EMERGENCY PANELS SHALL BE PAINTED RED WITH RED-LETTER NAME TAGS. PANELBOARD DIRECTORIES: PROVIDE A STEEL DIRECTORY FRAME MOUNTED INSIDE THE DOOR WITH A HEAT-RESISTANT TRANSPARENT FACE AND A DIRECTORY CARD FOR IDENTIFYING THE LOADS SERVED. IDENTIFY EACH CIRCUIT WITH LOAD AND LOCATIONS (ROOM NAMES AND ROOM NUMBERS) AND INDICATE WITH TYPED DIRECTORIES. (EXAMPLE: 5 DUPLEX RECEPTACLES, OFFICE, RM XXX). INSTALL THE PANELBOARDS SUCH THAT THE CENTER OF THE SWITCH OR CIRCUIT BREAKER IN THE HIGHEST POSITION WILL NOT BE MORE THAN 6 ½ FEET ABOVE THE FLOOR OR WORKING PLATFORM.

FOR EACH PANEL: FURNISH & INSTALL ONE SPARE 3/4" CONDUIT FOR EVERY 6 SPARES AND/OR SPACES IN THE PANEL. EACH SPARE CONDUIT SHALL BE INSTALLED WITH PULL STRING STUBBED TO A J-BOX LOCATED IN ACCESSIBLE CEILING/PLENUM SPACE. INSTALL A MINIMUM OF ONE SPARE 3/4" CONDUIT FOR EVERY PANEL SHOWN ON PLANS, EVEN IF THERE ARE NO SPARES/SPACES IN SOME PANELS ACCEPTABLE MANUFACTURERS ARE GE, SQUARE D, EATON/CUTLER-HAMMER, AND SIEMENS. MATCH EXISTING WHERE REQUIRED BY

# 26 28 19 ENCLOSED SAFETY SWITCHES

ALL SAFETY SWITCHES SHALL BE HEAVY-DUTY TYPE WITH QUICK-MAKE, QUICK-BREAK CONTACTS AND SUITABLE FOR TERMINATING 75-DEGREE C WIRE. PROVIDE EACH SWITCH WITH A GROUND LUG. PROVIDE A DEFEATABLE, FRONT ACCESSIBLE, COIN-PROOF DOOR INTERLOCK TO PREVENT OPENING THE DOOR WHEN THE SWITCH IS IN THE ON POSITION AND TO PREVENT TURNING THE SWITCH ON WHEN THE DOOR IS OPEN. PROVIDE INCOMING LINE TERMINALS WITH AN INSULATED SHIELD SO THAT NO LIVE PARTS ARE EXPOSED WHEN THE DOOR IS OPEN. PROVIDE EACH SWITCH WITH AN ISOLATED, FULLY RATED NEUTRAL BLOCK WITH PROVISIONS FOR BONDING THE BLOCK TO THE ENCLOSURE. WHERE FUSIBLE SWITCHES ARE SHOWN, PROVIDE SWITCHES WITH REJECTION-TYPE FUSE HOLDERS WHICH ARE SUITABLE FOR USE WITH FUSES. IN GENERAL, MOUNT SWITCHES SO THAT OPERATING HANDLE IS APPROXIMATELY 44 INCHES ABOVE FINISHED FLOOR: WHERE GROUPED. ALIGN TOPS OF SWITCHES. ACCEPTABLE MANUFACTURERS ARE GE, SQUARE D, EATON/CUTLER-HAMMER, AND SIEMENS. MATCH EXISTING WHERE REQUIRED BY OWNER.

26 22 00 DRY TYPE TRANSFORMERS

PROVIDE DRY TYPE QUIET TRANSFORMERS (PER ANSI -C89 AND UL 506), SELF-COOLED NEMA CLASS AA. COPPER WIRE WINDINGS. ALUMINUM-WINDING TRANSFORMER IS ACCÈPTABLE, PROVIDED THAT SUBSTITUTE ALUMINUM TRANSFORMER IS IN COMPLIANCE WITH NEC CLEARANCE REQUIREMENTS. TRANSFORMERS MUST MEET OR EXCEED NEMA TP-1 ENERGY EFFICIENCY STANDARDS.

FURNISH FULL-LOAD TAPS IN THE PRIMARY WINDINGS AS FOLLOWS: TAPS (2) 5%TAPS BELOW RATED VOLTAGE KVA RATING

3-15 KVA SINGLE PHASE 9-15 KVA, THREE PHASE (2) 5% TAPS BELOW RATED VOLTAGE

(6) 2.5% TAPS, (4) BELOW & (2) ABOVE RATED VOLTAGE 25-100 KVA SINGLE PHASE 30-300 KVA, THREE PHASE (6) 2.5% TAPS, (4) BELOW & (2) ABOVE RATED VOLTAGE

(4) 2.5% TAPS, (2) BELOW & (2) ABOVE RATED VOLTAGE 500 KVA. THREE PHASE (4) 2.5% TAPS, (2) BELOW & (2) ABOVE RATED VOLTAGE

SELECT THE APPROPRIATE TAP SETTING ON TRANSFORMER SO THAT THE ACTUAL SECONDARY VOLTAGE IS ±1/2 OF A TAP SPAN AT FULL LOAD. RECORD THE TRANSFORMER SERIAL NUMBER, KVA RATING, SELECTED TAP SETTING AND SECONDARY VOLTAGE READINGS. SUBMIT COPIES OF THE RECORD TO THE ARCHITECT/ENGINEER.

AVERAGE SOUND LEVELS MUST NOT EXCEED THE FOLLOWING VALUES:

<u>DB</u> 10-50 51-150 151-300 301-500

PROVIDE A 220C INSULATION SYSTEM FOR A MAXIMUM 115-DEGREE C TEMPERATURE RISE OVER A 40-DEGREE C AMBIENT. SPECIAL TRANSFORMERS: 150-DEGREE C RISE FOR SHIELDED ISOLATION TYPE; 115-DEGREE C RISE FOR K-RATED TRANSFORMERS. MAKE TRANSFORMER CABLE CONNECTIONS WITH COMPRESSION-TYPE LUGS SUITABLE FOR TERMINATIONS OF 75C RATED CONDUCTORS. CONSTRUCT CONCRETE PAD FOR FLOOR-MOUNTED TRANSFORMERS. MAINTAIN A MINIMUM OF 6 INCHES FREE AIR SPACE BETWEEN ENCLOSURE AND WALL. MOUNT TRANSFORMERS ON VIBRATION ISOLATING PADS SUITABLE FOR ISOLATING THE TRANSFORMER NOISE PROVIDE DOUBLE OR ADDITIONAL LUGS AS REQUIRED WHERE TWO OR MORE SECONDARY FEEDERS ARE CONNECTED TO

TRANSFORMERS. PROVIDE VIBRATION ISOLATORS FOR ALL TRANSFORMERS. ACCEPTABLE MANUFACTURERS ARE GE, SQUARE D, EATON/CUTLER-HAMMER, AND SIEMENS. MATCH EXISTING WHERE REQUIRED BY OWNER

# GENERAL NOTES:

IS NOT ALLOWED.

ENGINEERS

PLANNERS

SCIENTISTS

**TECHNOLOGIES** 

CONSTRUCTION MANAGERS

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- ALL CIRCUIT NUMBERS SHOWN ARE FOR REFERENCE ONLY. FIELD VERIFY ACTUAL CIRCUIT NUMBERS REQ'D AND ADJUST ACCORDINGLY. PROVIDE TYPE-WRITTEN DIRECTOR(IES) REFLECTING ACTUAL CIRCUIT NUMBERS USED, WITH FIELD REVISED/ RELOCATED CIRCUITS CLEARLY INDICATED. DIRECTOR(IES) SHALL INCLUDE DATE AND PROJECT DESCRIPTION,
- EACH CIRCUIT IS SHOWN WITH AN INDIVIDUAL HOMERUN. E.C. MAY ELECT TO COMBINE TWO OR MORE CIRCUITS IN ONE COMMON CONDUIT AND WITH COMMON NEUTRAL WHERE ALLOWED (CIRCUITS WITH HIGH CONTENT OF HARMONIC CURRENTS MAY NOT USE COMMON NEUTRAL, EXAMPLE: CIRCUITS WITH NON-LINEAR ELECTRONIC POWER SUPPLIES SUCH AS COMPUTERS, COPIERS, PRINTERS, ETC). NOTE: AMPACITIES OF CONDUCTORS SHALL BE REDUCED IF MORE THAN THREE CURRENT CARRYING CONDUCTORS ARE INSTALLED IN A RACEWAY. SEE N.E.C. ARTICLE 310.15(B)(2)(A)

"ADJUSTMENT FACTORS". CONDUCTORS SHALL BE DERATED IF 4 OR MORE WIRES ARE INSTALLED IN ONE CONDUIT (SEE RELATED NOTE "G3" ON TEMPERATURE LIMITATION OF CONDUCTOR AMPACITY), TYPICAL EXAMPLES FOR 20-AMP <u>CIRCUITS</u> ARE SHOWN BELOW:

CURRENT	IN TABLES AS	OR MORE WIRE IN	OR MORE WIRE IN	OR MORE WIRE IN
CARRYING	ADJUSTED FOR TEMP	ONE CONDUIT 60°C	ONE CONDUIT 75°C	ONE CONDUIT 90°C
CONDUCTORS	IF NECESSARY	WIRE (E.G.: TW)	WIRE (E.G.: THWN)	WIRE (E.G.: THHN)
4 THRU 6	80%	#12	#12	#12
7 THRU 9	70%	#10	#10	#12
10 THRU 20	50%	#8	#8	#10
21 THRU 30	45%	#6	#8	#8
31 THRU 40	40%	#6	#8	#8
41 AND ABOVE	35%	#4	#6	#6

TEMPERATURE LIMITATIONS ON AMPACITY OF CONDUCTOR: THE AMPACITY OF A CONDUCTOR SHALL BE SELECTED BASED ON THE NATIONAL ELECTRICAL CODE ARTICLES 310.15 AND 110.14.(C)(1),(2). THE TEMPERATURE LIMITATIONS NOTED IN 110.14.(C)(1),(2) MAY BE PARAPHRASED AS FOLLOWS: (A) CIRCUITS RATED 100 AMP OR LESS: USE 60-DEGREE C RATED CONDUCTORS ONLY. 75-DEGREE C AND 90-DEGREE C CONDUCTOR MAY BE USED BUT ONLY AT 60-DEGREE C AMPACITY. EXCEPTIONS: HIGHER TEMPERATURE CABLE ARE ALLOWED PROVIDED THE EQUIPMENT IS LISTED AND IDENTIFIED FOR USE WITH THE HIGHER RATED CONDUCTORS. (B) CIRCUITS RATED MORE THAN 100 AMP OR CONDUCTOR LARGER THAN #1 AWG: USE 75-DEGREE C RATED CONDUCTORS ONLY. 90-DEGREE C CONDUCTOR MAY BE USED BUT ONLY AT 75-DEGREE C AMPACITY. EXCEPTIONS: HIGHER TEMPERATURE CABLE ARE ALLOWED PROVIDED THE EQUIPMENT IS LISTED AND IDENTIFIED FOR USE WITH THE HIGHER RATED CONDUCTORS.

- WIRES OVERSIZED TO ALLEVIATE VOLTAGE DROP: WHERE OVERSIZED WIRES ARE USED TO ALLEVIATE VOLTAGE DROP. CONTRACTOR TO PROVIDE REDUCER LUGS AND/OR J-BOXES AS REQUIRED TO TERMINATE WIRES IN EQUIPMENT. ALL CONDUIT AND WIRE MUST BE CONCEALED FROM VIEW. EXPOSED CONDUIT AND WIRE ARE NOT ACCEPTABLE.
- EXCEPTIONS ARE CENTRAL PLANT. MECHANICAL/ELECTRICAL ROOMS. EXISTING CONSTRUCTION: ALL NEW WIRINGS INSTALLED IN EXISTING WALL/CEILING/MILLWORK SHALL BE CONCEALED, INCLUDING CONCRETE BLOCK WALL. PATCH ANY CUT AREAS TO MATCH EXISTING CONDITION.
- ALL ELECTRICAL AND COMMUNICATION DEVICES (LIGHT SWITCHES, RECEPTACLES, TELEPHONE, DATA ETC.) SHALL BE RECESSED MOUNTED UNLESS NOTED OTHERWISE. FIELD VERIFY RECEPTACLE MOUNTING REQUIREMENTS WITH OWNER/ ARCH., MOUNT ALL DUPLEX RECEPTACLES WITH THE "U" GROUND TERMINAL ON TOP, UNLESS NOTED OTHERWISE OR AS REQUIRED BY OWNER/ARCH. NEUTRAL TERMINAL SHALL BE ON TOP FOR HORIZONTALLY MOUNTED RECEPTACLES.
- ALL OUTLETS ON DEDICATED CIRCUITS (MARKED "DED" OR "D" ON PLANS) SHALL BE PROPERLY IDENTIFIED BY USING DISTINCTIVE COLOR DEVICES (USE BROWN OR GRAY DEVICES. <u>CONFIRM COLOR REQUIREMENTS WITH ARCHITECT/OWNER</u>.). COVER PLATES SHALL BE MARKED WITH CIRCUIT NUMBER(S) AND LOADS SERVED. EXAMPLE : CKT #
- EQUIPMENT LAYOUT IS BASED ON SQUARE D AND/OR SIEMENS. EQUIPMENT BY OTHER MANUFACTURERS SUCH AS GE MAY HAVE LARGER DIMENSIONS. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO PROVIDE EQUIPMENT WITH SIMILAR DIMENSIONS THAT WOULD FIT IN THE SPACE NOTED. VERIFY LOCATION OF ALL OUTLETS (POWER & COMMUNICATION) WITH OWNER/ARCH PRIOR TO ROUGH-IN, OWNER
- RESERVES THE RIGHT TO MOVE ANY OUTLETS 5 FEET IN ANY DIRECTION PRIOR TO ROUGH-IN. ALL RECEPTACLES WITHIN 6 FEET OF ANY WET AREA (EXAMPLE : SINK, DISHWASHER, ETC..) SHALL HAVE GROUND FAULT PROTECTION, WHETHER SPECIFICALLY INDICATED OR NOT ON DRAWINGS.
  MOUNTING HEIGHTS OF ALL OUTLETS (RECEPTACLES, SWITCHES, TELEPHONE, DATA, ETC.) IN AREAS WITH COUNTERTOP
- SHALL BE VERIFIED WITH ARCH/OWNER. GENERALLY ALL OUTLETS ARE TO BE MOUNTED ABOVE COUNTERTOP EXCEPT OUTLETS FOR DISPOSERS, UNDERCOUNTER DISHWASHER, UNDERCOUNTER REFRIGERATORS ETC. REFER TO ARCH INTERIOR ELEVATIONS
- ALL WEATHERPROOF/WET LOCATION AND/OR OUTDOOR RECEPTACLES SHALL HAVE "WEATHERPROOF-IN-USE" COVERS (NEC ARTICLE 406.8(B)). PROVIDE RACO BELL RAYNTITE II COVERS OR EQUAL. SWITCHES/STARTERS FOR MECH AND OTHER EQUIPMENT: LOCATION OF DISCONNECT SWITCHES, STARTERS, CONTROL STATIONS ETC ARE SHOWN DIAGRAMMATICALLY ON THE DRAWINGS. E.C. SHALL INSTALL SUCH DEVICES IN COMPLIANCE
- WITH CODE REQUIRED CLEARANCE REQUIREMENTS. ALL SUCH DEVICES SHALL BE ACCESSIBLE AFTER EQUIPMENT ARE IN PLACE AND SATISFY CODE CLEARANCE REQUIREMENTS. REMOVE AND RE-INSTALL DEVICES THAT ARE INACCESSIBLE OR WITH INADEQUATE CODE CLEARANCE. COORDINATE INSTALLATION W/HVAC HVAC EQUIPMENT : OVERCURRENT DEVICES, DISCONNECT SWITCHES, CONDUIT/WIRE ARE SELECTED BASED ON
- EQUIPMENT SHOWN ON MECHANICAL DRAWINGS. FIELD VERIFY RATINGS OF EQPT SUPPLIED BY HVAC, REVISE ELECTRICAL AS REQUIRED TO MATCH ACTUAL EQPT SUPPLIED BY MECH CONTRACTOR. OUTDOOR PAD-MOUNTED A/C EQUIPMENT : CONNECT A/C EQUIPMENT TO OUTDOOR NEMA 3R DISCONNECT SWITCHES

SEALTITE FROM CONDUIT STUBUP TO EQUIPMENT, MAXIMUM LENGTH OF SEALTITE 5 FEET. SEALTITE LONGER THAN 5 FEET

WITH UNDERGROUND RIGID CONDUIT FEEDER, STUB UP CONDUIT NEAR EQUIPMENT CONNECTION POINT. PROVIDE

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**ELECTRICAL SPECIFICATIONS** 

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E0.01

# LIGHTING GENERAL NOTES

- A. VERIFY COLOR OF ALL FIXTURES WITH ARCHITECT/OWNER.
- B. DRAWINGS DO NOT SHOW DETAILS OF FIXTURE MOUNTING. ELECTRICAL CONTRACTOR TO PROVIDE ALL NECESSARY AND REQUIRED MOUNTING HARDWARE AND ACCESSORIES AS REQUIRED FOR A COMPLETE AND OPERATING SYSTEM. SLOPED CEILING: PROVIDE SLOPED-CEILING ADAPTORS AS REQUIRED FOR ALL FIXTURES INSTALLED IN SUCH CEILING
- C. ACCEPTABLE LAMP MANUFACTURERS: MATCH BASE BUILDING STANDARDS. ACCEPTABLE BALLAST MANUFACTURERS: MATCH BASE BUILDING STANDARDS.
- D. ALL FIXTURES SHALL BE FACTORY PAINTED-AFTER-FABRICATION TYPE.
- E. IN GENERAL, ALL FIXTURES IN AREAS WITH LAY-IN CEILING ARE CONNECTED USING EMT CONDUIT AND 6-FT (MAXIMUM LENGTH) FIXTURE WHIP. ON PLAN DRAWINGS, FIXTURE CIRCUITING AND CONNECTION ARE SHOWN DIAGRAMMATICALLY WITH ARCS AND CURVES. SUCH DIAGRAMMATIC REPRESENTATION DOES NOT IMPLY OR INDICATE EXCLUSIE USE OF ARMORED OR METAL CLAD CABLE (TYPE BX OR MC). ALL FIXTURE CONNECTION IN AREAS WITH LAY-IN CEILING SHALL BE MADE WITH CONDUIT AND WHIPS
- F. EXISTING FIXTURES RELOCATED BY ELECTRICAL CONTRACTOR: PROVIDE NEW MOUNTING ACCESSORIES, PLASTIC FRAME, BRACKET, BOXES, ETC.. AS REQUIRED FOR A COMPLETE AND OPERATING SYSTEM.
- G. EXISTING FIXTURES RE-USED BY ELECTRICAL CONTRACTOR: EXISTING FIXTURES INDICATED TO BE RE-USED SHALL BE CLEANED AND RE-LAMPED. ELECTRICAL CONTRACTOR TO EXAMINE CONDITION OF EXISTING BALLAST REPLACE IF NOISY OR DEFECTIVE. ALL BALLAST DATED BEFORE 1976 ARE PRESUMED TO CONATIN PCB AND SHALL BE REMOVED BY THE ELECTRICAL CONTRACTOR. DISPOSE OF SUCH BALLAST IN STRICT COMPLIANCE WITH APPLICABLE FEDERAL AND STATE LAWS AND LOCAL ORDINANCES. FIXTURES NOT INDICATED FOR RE-USE SHALL BE DELIVERED TO A LOCATION TO BE SPECIFIED BY OWNER. DISPOSE OF SUCH FIXTURES IF NOT NEEDED BY OWNER

# **2015 IECC**

A COMMISSIONING PLAN MUST BE DEVELOPED BY A REGISTERED DESIGN PROFESSIONAL OR APPROVED AGENCY. THE PLAN SHALL INCLUDE THE **FOLLOWING ITEMS:** 

- A NARRATIVE DESCRIPTION OF THE ACTIVITIES THAT WILL BE
- ACCOMPLISHED DURING EACH PHASE OF COMMISSIONING. A LISTING OF THE SPECIFIC EQUIPMENT, APPLIANCES OR SYSTEMS TO BE
- TESTED AND A DESCRIPTION OF THE TESTS TO BE PERFORMED.
- FUNCTIONS TO BE TESTED.
- CONDITIONS UNDER WHICH THE TEST WILL BE PERFORMED.
- MEASURABLE CRITERIA FOR PERFORMANCE

CONTRACTOR SHALL BE RESPONSIBLE FOR THE DEVELOPMENT AND IMPLEMENTATION OF THE COMMISSIONING PLAN

# LIGHTING COMMISSIONING NOTES

- LIGHTING SYSTEM COMMISSIONING ACTIVITIES INCLUDE BUT SHALL NOT BE
  - SUBMITTAL REVIEWS
  - FIELD OBSERVATION
  - ENSURE ALL FIXTURES HAVE LAMPS AND ARE OPERATIONAL
  - TEST EMERGENCY LIGHTING (INCLUDING EXIT SIGNS)
  - ENSURE ALL OCCUPANCY & DAYLIGHT SENSORS HAVE BEEN INSTALLED PER THE MANUFACTURERS INSTRUCTIONS AND ARE
  - **OPERATING AS INTENDED** - VERIFY STATUS INDICATORS ON DEVICES ARE CORRECT.
  - CONFIRM SWITCHES AND DEVICES CONTROL LIGHT FIXTURES AS
- INDICATED ON THE DRAWINGS.
- THE LIST OF COMMISSIONED SYSTEMS INCLUDES, BUT SHALL NOT BE LIMITED TO:
  - LIGHT FIXTURES
  - EXIT SIGNS
  - EMERGENCY EGRESS LIGHTING
  - OCCUPANCY SENSORS
  - DAYLIGHT SENSORS
  - TIME-CLOCK & TIME-SWITCH CONTROLS - DIMMER SYSTEMS

BAS INTERFACE

 DOCUMENTATION CERTIFYING THE INSTALLED LIGHTING CONTROLS MEET DOCUMENTED PERFORMANCE CRITERIA OF SECTION C405 OF THE 2015 IECC ARE TO BE PROVIDED TO THE BUILDING OWNER WITHIN 90 DAYS OF THE RECEIPT OF THE CERTIFICATE OF OCCUPANCY.

# **ELECTRICAL DEMOLITION GENERAL NOTES**

- A. PLANS DO NOT ATTEMPT TO SHOW ALL DEMOLITION ITEMS. SOME LIGHT FIXTURES, SWITCHES/DIMMERS, EXIT LIGHTS, RECEPTACLES, TELEPHONE, DATA, MISC. OUTLETS ARE SHOWN FOR INFORMATION PURPOSE. HOWEVER, THE ITEMS SHOWN ARE NOT NECESSARILY COMPLETE, ELECTRICAL CONTRACTOR (E.C.) TO FIELD VERIFY ALL DEMOLITION ITEMS AND PROVIDE REMOVAL OF ALL DEVICES ACCORDINGLY. SEE RELATED NOTES ON MAINTAINING SEVICE TO NON-DEMOLITION AREAS. E.C. SHALL REMOVE ALL EXISTING LIGHTING FIXTURES, ASSOCIATED SWITCHES/DIMMERS, EXIT LIGHTS, RECEPTACLES, TELEPHONE, DATA, MISC. OUTLETS WHERE SHOWN IN DEMOLITION AREAS. REMOVE CONDUIT/WIRE BACK TO PANEL(S) UNLESS RE-USED FOR NEW AND/OR RELOCATED WORKS. EXISTING CONDUIT/WIRE WITH ADEQUATE CAPACITY FOR NEW AND/OR EXISTING LOADS MAY BE RE-USED. SIMILARLY FOR COMMUNICATION SYSTEM CONDUIT/WIRE (REMOVE BACK TO CONTROL PANEL(S) IF NOT RE-USED). LIGHT FIXTURES IN GOOD CONDITION MAY BE RE-USED IF SO INDICATED ON DRAWINGS. LIGHT FIXTURES TO BE RE-USED SHALL BE RE-LAMPED AND CLEANED. REPLACE BALLASTS IF NOISY OR INOPERATIVE. E.C. TO EXAMINE CONDITION OF ALL EXISTING BALLASTS, IF ANY BALLASTS ARE SUSPECTED TO CONTAIN PCB'S, DO NOT DISPOSE OF; SET SUCH ASIDE AND NOTIFY OWNER FOR AUTHORIZED REMOVAL. REMOVE SUCH BALLASTS IN STRICT COMPLIANCE WITH FEDERAL, STATE AND LOCAL LAWS AND ORDINANCES. BALLASTS DATED PRIOR TO 1976 OR NOT SPECIFICALLY MARKED "NO PCB'S" SHALL BE CONSIDERED TO CONTAIN PCB'S. FIXTURES NOT INDICATED FOR RE-USE SHALL BE DELIVERED TO A LOCATION TO BE SPECIFIED BY OWNER. ALL FIXTURES UPSTREAM OR DOWNSTREAM OF DEMO'D FIXTURES AND ON THE SAME CKTS SHALL BE RECONNECTED TO MAINTAIN SERVICE. PROVIDE NEW CONDUIT/WIRE AS REQ'D.
- B. DAMAGE TO EXISTING MATERIALS/EQUIPMENT WILL BE REPAIRED AT NO ADDITIONAL COST TO OWNER. RE-SUPPORT ANY REMAINING CONDUIT OR DEVICE THAT WERE SUPPORTED BY WALLS/MILLWORK BEING REMOVED.
- C. NON-DEMOLITION AREAS: DEMOLITION WORKS SHALL NOT AFFECT AREAS NOT INCLUDED IN DEMOLITION. E.C. SHALL BE RESPONSIBLE FOR THE CONTINUITY OF ALL SERVICES (POWER, TELEPHONE, FIRE ALARM, DATA) IN NON-DEMOLITION AREAS. ALL SERVICES SHALL BE MAINTAINED AT ALL TIMES. ELECTRICAL CONTRACTOR (E.C.) SHALL MAINTAIN SERVICE BY EXTENDING, REROUTING AND/OR RE-CONNECTING ANY CIRCUITS AFFECTED BY DEMOLITION. PROVIDE ADDITIONAL CONDUIT/WIRE AS REQUIRED TO MAINTAIN SERVICE. CIRCUITS IN NON-DEMOLITION AREAS THAT ARE CONNECTED TO DEMO'D PANELS AND/OR CIRCUITS SHALL BE RE-CIRCUITED TO A NEW SUB-PANEL (FURNISHED AND INSTALLED BY E.C., SIZE AS REQUIRED) IF SPACES/SPARES ARE NOT AVAILABLE IN ANY NEW PANELS IN RENOVATION AREAS. PROVIDE TEMPORARY POWER AS REQUIRED DURING CHANGE-OVER TO MAINTAIN CONTINUOUS SERVICE. PROVIDE TEMPORARY POWER FOR ALL RELOCATED CIRCUITS AS REQUIRED TO MAINTAIN CONTINUOUS SERVICE. SIMILARLY FOR FIRE ALARM, SECURITY, DATA
- D. E.C. SHALL FIELD INVESTIGATE EXISTING ELECTRICAL INSTALLATION. ALL EXISTING INSTALLATION IN THE RENOVATION AREAS THAT ARE TO REMAIN BUT ARE NOT CURRENTLY IN COMPLIANCE WITH CURRENT CODES SHALL BE CORRECTED BY E.C., INCLUDING BUT NOT LIMITED TO THE FOLLOWINGS:
- UN-SUPPORTED CONDUIT AND JUNCTION BOXES LAYING ON TOP OF CEILING TILES. CONDUIT AND/OR JUNCTION BOXES SUPPORTED ONLY BY TIE-WIRE. RAISE AND SUPPORT CONDUIT WITH STRAP PER SPECS. PROVIDE NEW CONDUIT/WIRE AS REQUIRED.
- CIRCUITS WITHOUT A SEPARATE GREEN GROUNDING WIRE INSTALL A

GROUNDING WIRE FOR EVERY RECEPTACLE OUTLET AND DEVICES. INSTALLATION OF THE GREEN GROUNDING WIRE MAY REQUIRE THE REMOVAL OF EXISTIN RES. PROVIDE NEW WIRE AS REQUIRED.

- FIXTURES IMPROPERLY SUPPORTED OR INADEQUATELY SUPPORTED BY DEVICE BOXES
- PROVIDE PROPER SUPPORT PER N.E.C.
- SEAL ALL PENETRATIONS THROUGH RATED

FLOORS/WALLS/CEILINGS/PARTITIONS WITH UL LISTED FIRESAFING MATERIAL. E. ALL EXISTING ABANDONED AND/OR UN-USED CONDUIT/WIRE. SWTCHES/STARTERS, J. BOXES, COMMUNICATION SYSTEM AND DEVICES IN PROJECT AREAS SHALL BE EMOVED BACK TO PANELS AND/OR CONTROL PANELS. ALL ITEMS DEMO'D BY E.C. SHALL BE REMOVEDB ACK TO PANELS. AND/OR CONTROL PANELS.

- EMERGENCY AND NORMAL POWER CIRCUITS IN THE SAME CONDUIT PROVIDE SEPARATION OF EMERGENCY AND NORMAL CIRCUITS AND INSTALL IN SEPARATE CONDUIT.

	ELECTRICAL SHEET LIST				
Sheet Number	Sheet Name				
E0.01	ELECTRICAL SPECIFICATIONS				
E0.02	ELECTRICAL SCHEDULES & LEGENDS				
E2.00	ELECTRICAL SITE PLAN				
E4.00	ELECTRICAL DETAILS				
E6.00	ELECTRICAL ONE LINE AND PANEL SCHEDULES				

# ELECTRICAL ARROEVIATIONS

ELE	ECTRICAL ABBREVIATIONS
(D)	Demo
(E)	Existing
(N)	New
(R) (RM)	Relocate
(RIVI) (R'D)	Remove Existing Equipment Relocated Equipment
AC AC	Alternating Current
AF	Ampere Fuse
AFF	Above Finished Floor
AHJ	Authority Having Jurisdiction
AIC AMP	Ampere Interrupting Capacity Ampere
AT	Ampere Trip
ATS	Automatic Transfer Switch
AWG	American Wire Gauge
C CB	Conduit Circuit Breaker
CFCI	Contractor Furnished Contractor Installed
CKT	Circuit
CLG	Ceiling
CT	Current Transformer
CU DISC.	Copper Disconnect
DISC.	Distribution
EA .	Each
E.C.	Electrical Contractor
FA	Fire Alarm
FAAP FACP	Fire Alarm Annunciation Panel
FLA	Fire Alarm Control Panel Full Load Amps
G.C.	General Contractor
GFI	Ground Fault Interrupter
GRD	Ground
GRS	Galvanized Rigid Steel
HP IDF	Horsepower Intermediate Distribution Frame
I.P.S.	Inverter Power System
JB	Junction Box
KVA	Kilo-Volt-Ampere
KW	Kilowatt
LAN LTS	Local Area Network Lights
LTG	Lighting
MCB	Main Circuit Breaker
MDF	Main Distribution Frame
MLO	Main Lugs Only
MTD MTG	Mounted
NEC	Mounting National Electrical Code
NEMA	National Electrical Manufacturers Association
NF	Non-Fused
NTS	Not to Scale
OFCI OFOI	Owner Furnished Contractor Installed Owner Furnished Owner Installed
OC	Overcurrent
OCP	Overcurrent Protection
Р	Pole
PA	Public Address
PB PH	Push Button Phase
PNL	Panel
RCPT	Receptacle
REC	Receptacle
RECP	Receptacle
REQ'D SN	Required Solid Neutral
SPECS	Specifications
SPKR	Speaker
SWBD	Switchboard
SWGR	Switchgear
TEL	Telephone
TTB TVSS	Telephone Terminal Board Transient Voltage Surge Suppressor
TYP.	Typical
UC, U/C	Under Counter
U.N.O.	Unless Noted Otherwise
V	Volt Ampara
VA VSD	Volt-Ampere Variable Speed Drive
W	Watt or Wire
W/	With
W/O	Without
WP XFMR	Weatherproof Transformer
⊥ ∧⊏IVI <b>ſ</b> ₹	Hausomet

**XFMR** 

XFR

Transformer

Transfer

# **ELECTRICAL LEGEND**

All Symbols Shown Are Not Necessarily Used In This Project (E) Existing (R)—— Relocated (D)—— Demo Single pole switch Digital switch (Refer to lighting controls legend) Switch with integral occupancy sensor (Refer to lighting controls legend) Ceiling or surface mounted occupany sensor (Refer to lighting controls legend) Manual Motor Starter With Proper Thermal Element Installed. Switch, Three-Way Momentary Contact Toggle Type With Center Neutral Position. Similar To ASCO # 173A2. Junction Box. Electrical Panel Boards. Disconnect Switch. All Switches Shall Be Heavy Duty Type (E.G. 30A/3P/600/NF/NEMA 1) Conduit Run Concealed in Wall or Ceiling ---- Conduit Run Concealed in Floor

- 1. The word "provide" as used in these drawings shall mean "materials and labdrefgemidhedtesrd installed by Electrical Contractor".
- 2. Mounting height of all light switches, dimmers, receptacles, telephone, data and signal outlets shall be in accordance with the 'American with Disabilities Act'.

Light Switches, Dimmers, etc. (+42")

Receptacles, Telephone, Data, etc. (+18")

Homerun to Electrical Panelboards

All mounting heights are measured from finished floor to center of device. Mounting heights shown on the architect drawings and specifications take precedence. Verify exact mounting height required with architect and install accordingly.

> ISSUE FOR PERMIT 03/11/19 DESCRIPTIO

> > H2B, INC. Texas Firm Registration No. 8856

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HCC BRAYS OAKS PARKING EXPANSION 8855 W BELLFORT BLVD HOUSTON, TX 77031

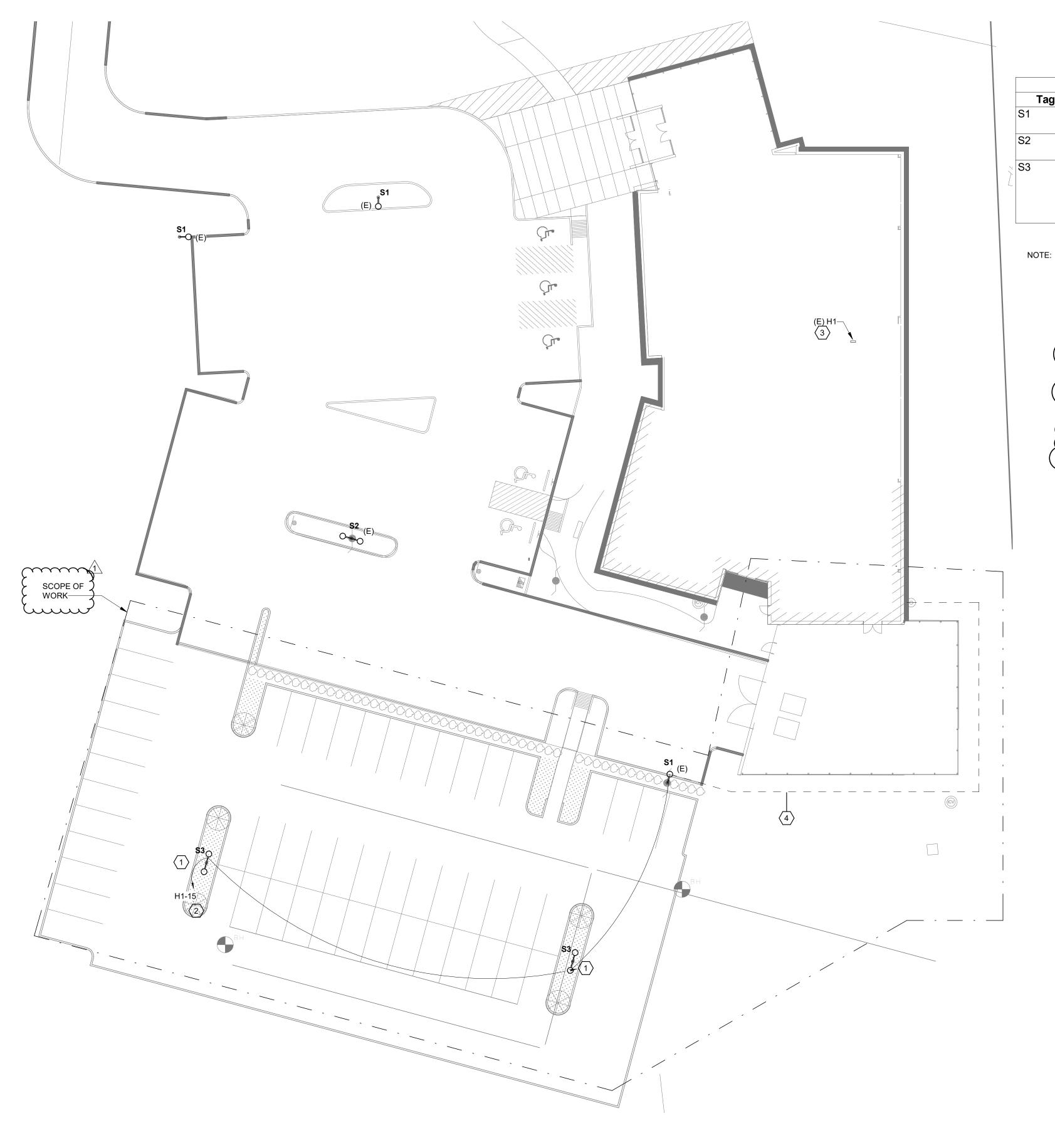
**ELECTRICAL** SCHEDULES & LEGENDS



SCIENTISTS TECHNOLOGIES Texas Registered Engineering Firm F-10573

CONSTRUCTION MANAGERS 801 TRAVIS, SUITE 2000 HOUSTON, TX 77002 PHONE: 713-237-9800 FAX: 713-237-9801

E0.02



1 SITE PLAN
1" = 20'-0"

LIGHTING FIXTURE SCHEDULE							
Tag	Manufacturer	Model Number	Description	Mounting	Lamp	Wattage	Voltage
S1	EXISTING POLE LIGHT	EXISTING POLE LIGHT	SINGLE HEAD POLE LIGHT	POLE MOUNTED	LED	376 W	277V
S2	EXISTING POLE LIGHT	EXISTING POLE LIGHT	DOUBLE HEAD POLE LIGHT	POLE MOUNTED	LED	752 W	277V
S3	HOLOPHANE	LAMP: MGLED-9-4K-AS-A-L-A-H-P3-D M-PCLX. POLE: SL-A-3-T2J-BP-P01-ABG-GH (J354A J354C-AB274)	DOUBLE HEAD POLE LIGHT MOUTNED AT 30 FEET	POLE MOUNTED	LED	752 W	277V

NOTE: FIXTURES TO BE PROCURED BY OWNER AND INSTALLED BY CONTRACTOR.

# **KEYNOTE LEGEND**

FURNISH AND INSTALL J-BOX TO SERVE POE SECURITY CAMERA. PROVIDE 1.5"C W/PULLSTRING FOR FUTURE ROUTING OF DATA CABLES. ROUTE CONDUIT BACK TO MDF ROOM LOCATED IN BUILDING. CONTRACTOR TO FIELD LOCATE EXACT LOCATION OF MDF ROOM PRIOR TO CONSTRUCTION. COORDINATE ALL REQUIREMENTS WITH OWNER'S SECURITY CONSULTANT PRIOR TO CONSTRUCTION.

CIRCUITING SHOWN FOR CLARIFICATION OF LOAD. CONTRACTOR TO RE-USE EXISTING CIRCUIT SERVING POLE LIGHTS. DO NOT EXCEED 16A ON A 20A/1P CIRCUIT. EXISTING LIGHTING CIRCUIT IS CONTROLLED BY AN EXISTING PHOTOCELL AND TIMECLOCK SWITCH. APPROXIMATE LOCATION OF PANEL ON SECOND FLOOR. FIELD VERIFY EXACT LOCATION. 4 PROPOSED ROUTING OF UNDERGROUND ROUTING FOR CONDUIT TO SERVE POE SECURITY CAMERAS. COORDINATE EXACT ROUTING AND ALL OTHER REQUIREMENTS WITH OWNER'S SECURITY CONSULTANT PRIOR TO START OF CONSTRUCTION.

1	ADDENDUM 1	04/22/19
	ISSUE FOR PERMIT	03/11/19
REV	DESCRIPTION	DATE

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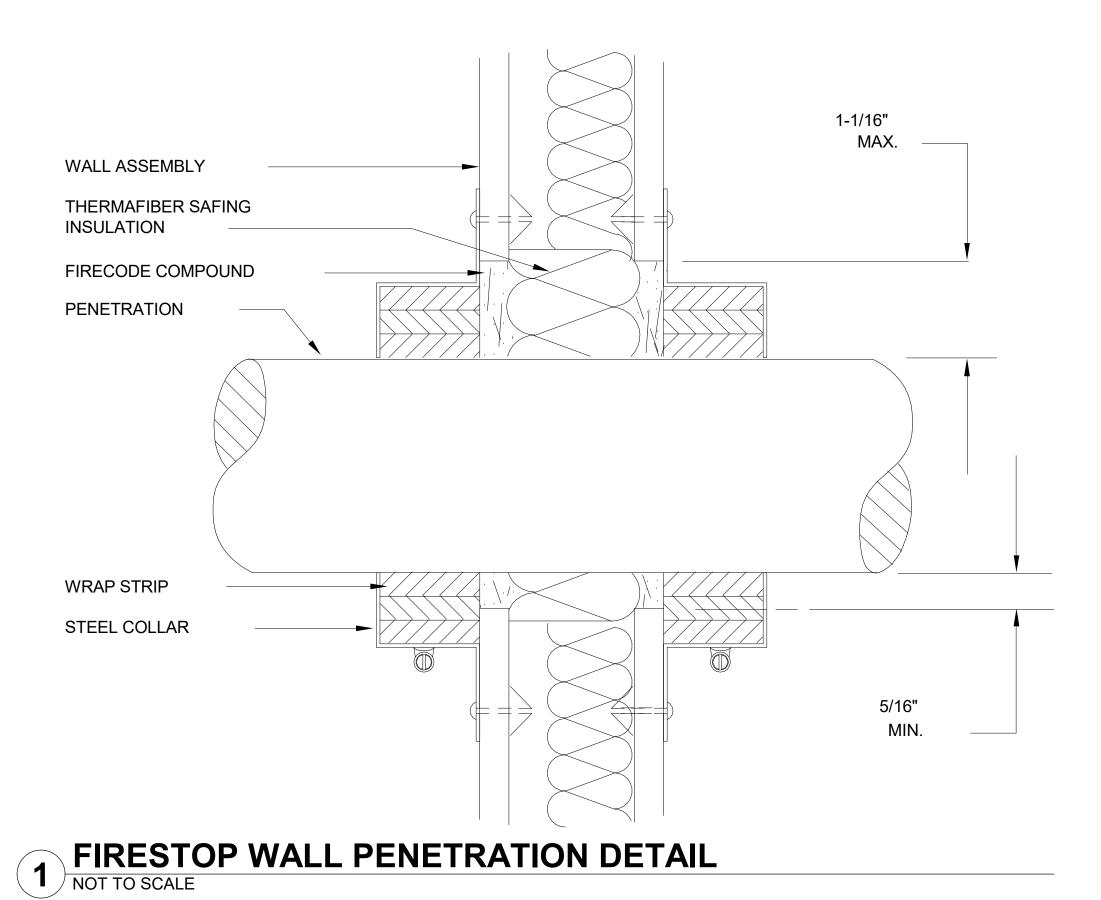
ELECTRICAL SITE PLAN



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ELECTRICAL DETAILS

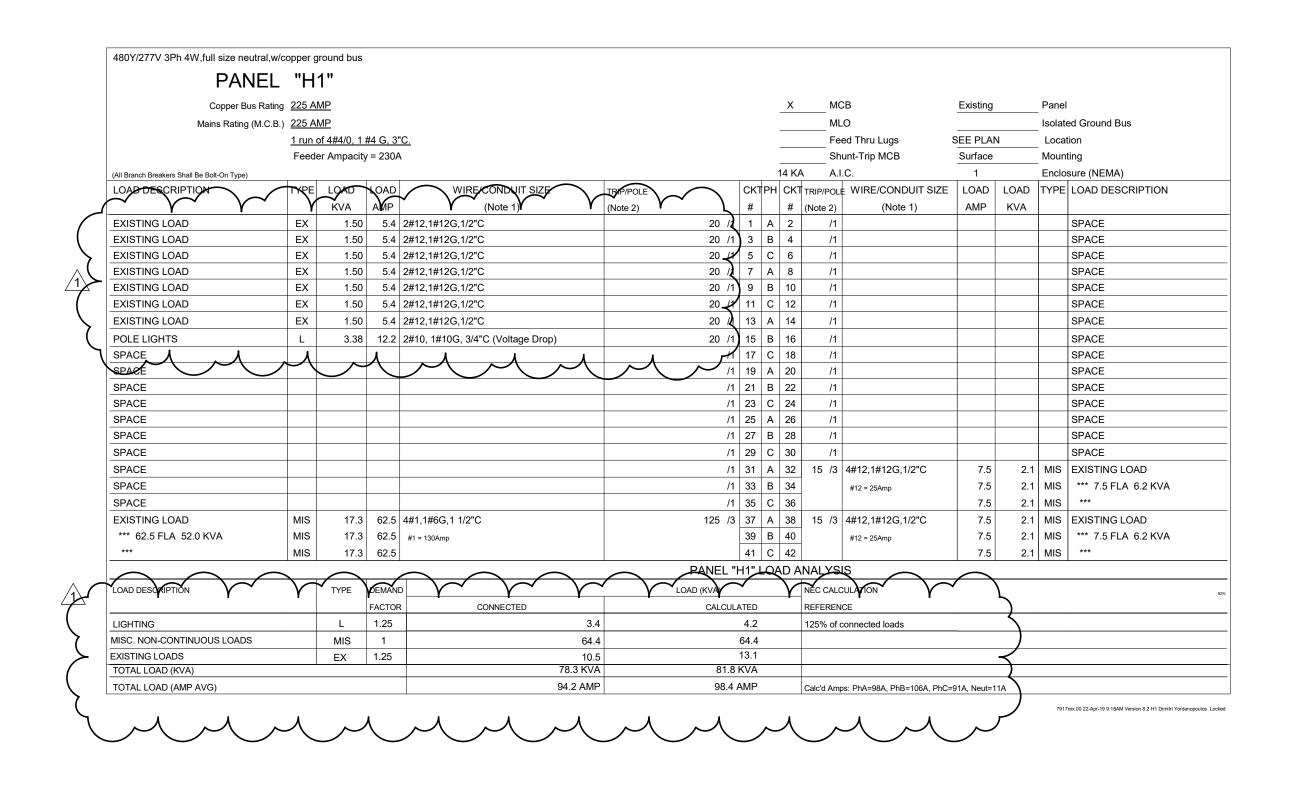


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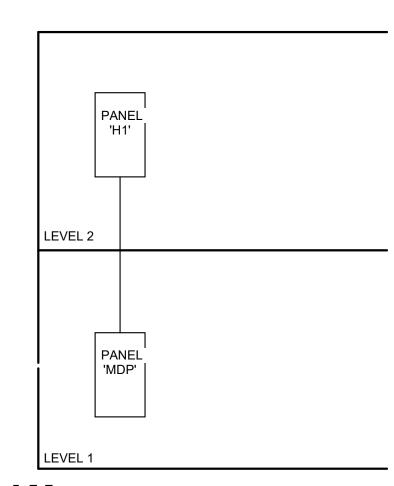
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\* SEE LOAD ANALYSIS, PANEL SCHEDULES FOR CONDUIT/WIRE SIZE. ALL WIRES SHALL HAVE TYPE "THHN/THWN" INSULATION TYPICAL UNLESS NOTED OTHERWISE. ALL INDOOR CONDUITS SHALL BE EMT TYPICAL UNLESS NOTED OTHERWISE. ALL OUTDOOR CONDUITS SHALL BE RIGID GALV STEEL TYPICAL UNLESS NOTED OTHERWISE. ALL UNDERGROUND CONDUITS SHALL BE PVC SCH 40 TYPICAL UNLESS NOTED OTHERWISE.

NOTE: ALL EQUIPMENT IS EXISTING UNLESS NOTED OTHERWISE



RISER DIAGRAM 1 NOT TO SCALE

# **NOTES - PANEL SCHEDULES**

Abbreviations: D.R. =DUPLEX RECEPTACLE S.R. = SINGLE RECEPTACLE PC=PERSONAL COMPUTER HACR=HEATING/AIR CONDITIONING RATED BKR

SWD=SWITCHING DUTY BKR VIF=VERIFY IN FIELD GP=GENERAL PURPOSE (E)=EXISTING (N)=NEW

Each circuit is shown as an individual homerun. Contractor may elect to combine two or three non-harmonics producing circuits in a common raceway. Contractor shall not install more than three circuits in a common conduit, except where specifically noted and allowed. Where more than

three conductors are installed in a common raceway, the ampacity of all current-carrying conductors shall be derated and conductor size increased per N.E.C. 2017 Article 310.15(B)(3)(a). All wires shall have THHN/THWN insulation unless noted otherwise.

Voltage drop - Use #10 wires for 20Amp 120V ckts longer than 75 feet, use #10 wires for 20Amp 277V ckts longer than 200 feet.

All breakers 100Amp or less shall be rated for 75/60C wire termination. Breakers rated for only 60C wire termination shall not be used.

All breakers greater than 100Amp shall be rated for 75C termination. N.E.C. 2017 Article 110.14(C)(1). For 3-pole breaker, provide 3 wires + grd where neutral is not used or req'd. Similarly for 2-pole bkr, provide 2 wires + grd if neut. is not req'd.

General Notes:

(A) Quantity and type of duplex & quad receptacles, light fixtures etc shown in panel schedule are for reference only, refer to

plans for exact quantity of outlets, light fixtures and other devices.

(B) All underground conduit shall be a minimum size of 3/4". (C) Each PC circuit shall have separate neutral wire. Do not share neutral wire between 2 or more circuits.

Similarly for all harmonics-producing circuits, provide dedicated neutral for each circuit serving such equipment.

(D) Provide isolated ground for each PC circuit in pre-wired furniture system.

(E) Provide HACR rated breaker for all air-conditioning /heating eqpt.

(F) Provide type-written Panel Directory with room name and devices served. Example: OFFICE 124, 3 RECEPTS

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ELECTRICAL ONE LINE AND PANEL SCHEDULES



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E6.00