## **TECHNOLOGY GENERAL NOTES:**

- ALL STRUCTURED CABLING SYSTEM (SCS) & LOW VOLTAGE (LV) CABLING USED THROUGHOUT THIS PROJECT SHALL COMPLY WITH THE REQUIREMENTS AS OUTLINED IN THE STANDARDS, CODES AND LOCAL REGULATIONS FOR THE FOLLOWING: ANSI/TIA-568-C, ANSI/TIA-569-D. ANSI/TIA-606-B. ANSI/TIA-607-B. BICSI TDMM (CURRENT VERSION), NEC ARTICLE 90, ARTICLE 300, NEC ARTICLE 645, NEC ARTICLE 646, NEC ARTICLE 725, NEC ARTICLE 760, NEC ARTICLE 770, NEC ARTICLE 800, NEC ARTICLE 830. THE SCS & TECHNOLOGY SYSTEM(S) MUST MEET ALL LOCAL AND OTHER PREVAILING CODES.
- ALL SCS & LV CABLING SHALL BEAR UL LISTED TYPE CMP (PLENUM RATED) AND/OR CM/G (GENERAL PURPOSE) AND/OR CMR (RISER RATED). ALL FIBER OPTIC CABLING SHALL BEAR OFNP (PLENUM RATED) AND/OR OFNR (RISER RATED) AND/OR OFN/G (GENERAL PURPOSE). THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING APPROPRIATELY RATED CABLE FOR THE ENVIRONMENT IN WHICH IT IS INSTALLED.
- ALL INSTALLATION SHALL BE DONE IN CONFORMANCE WITH ANSI/TIA-568-C STANDARDS AND MANUFACTURERS INSTALLATION GUIDELINES. THE CONTRACTOR SHALL ENSURE THAT THE CABLE'S MINIMUM BEND RADIUS AND, MAXIMUM PULLING TENSIONS OF THE SPECIFIED DISTRIBUTION CABLES ARE NOT EXCEEDED. THE CABLE BENDS MUST MAINTAIN THE PROPER RADIUS DURING THE PLACEMENT OF THE FACILITIES. FAILURE TO FOLLOW THE APPROPRIATE GUIDELINES WILL REQUIRE THE CONTRACTOR TO PROVIDE, IN A TIMELY FASHION, ANY ADDITIONAL MATERIAL AND LABOR NECESSARY TO PROPERLY RECTIFY THE SITUATION TO THE SATISFACTION AND WRITTEN APPROVAL OF THE OWNERS REPRESENTATIVE. THIS SHALL ALSO APPLY TO ANY AND ALL DAMAGES SUSTAINED TO THE CABLES BY THE CONTRACTOR DURING THE IMPLEMENTATION.
- ALL SCS AND/OR LV INSTALLATIONS SHALL BE PERFORMED BY QUALIFIED TECHNICIANS FOR THAT SYSTEM. THE LABOR EMPLOYED BY THE CONTRACTOR SHALL BE REGULARLY EMPLOYED IN THE INSTALLATION AND REPAIR OF SCS AND/OR LV SYSTEMS AND SHALL BE ACCEPTABLE TO THE OWNERS REPRESENTATIVE TO ENGAGE IN THE INSTALLATION AND SERVICE OF THIS SYSTEM.
- THE MDF AND IDF SPACES ARE DESCRIBED BELOW. AND ENCOMPASS THE AREAS THE COMMUNICATIONS CABLING EXISTS IN. THESE AREAS INCLUDE (BUT NOT LIMITED TO) THE BACKBOARDS, CABINETS, RACKS, FRAMES, LADDER RACKS, TERMINATION FIELDS, AND PATCH CORDS. (WALL AND RACK TYPES FOR COPPER AND FIBER). THE SCS CONTRACTOR IS RESPONSIBLE FOR FOLLOWING THE STANDARDS, CODES AND LOCAL REGULATIONS FOR THESE SPACES, (E.G. ANSI/TIA-568-C, ANSI/TIA-569-D, ANSI/TIA-606-B, ANSI/TIA-607-B, BICSI TDMM (CURRENT VERSION), NEC ARTICLE 90, ARTICLE 300, NEC ARTICLE 645, NEC ARTICLE 646, NEC ARTICLE 725, NEC ARTICLE 770, NEC ARTICLE 800, NEC ARTICLE 830.
- THE WIRING OF THE SYSTEM SHALL BE EXECUTED IN ACCORDANCE WITH THE DRAWINGS AND THE EQUIPMENT MANUFACTURER'S WIRING DIAGRAMS. SHOULD ANY VARIATIONS IN THESE REQUIREMENTS OCCUR, THE CONTRACTOR SHALL NOTIFY THE OWNERS REPRESENTATIVE BEFORE MAKING ANY CHANGES. IT SHALL BE THE RESPONSIBILITY OF THE MANUFACTURER - AUTHORIZED INSTALLER OF THE APPROVED EQUIPMENT TO INSTALL THE EQUIPMENT AND GUARANTEE THE SYSTEM TO OPERATE AS PER PLANS AND SPECIFICATIONS.
- 7. ALL MATERIALS SHALL BE NEW. NO USED OR RE-MANUFACTURED PARTS OR COMPONENTS SHALL BE ACCEPTED.
- THE CONTRACTOR SHALL NOT ROLL OR STORE CABLE REELS WITHOUT AN APPROPRIATE UNDERLAY AND THE PRIOR WRITTEN APPROVAL OF OWNERS REPRESENTATIVE.

## SPECIAL EQUIPMENT AND TOOLS:

IN ORDER TO ENSURE THE LEAST AMOUNT OF CABLE UNTWISTING, IT IS REQUIRED THAT ALL CABLES SHALL BE STRIPPED USING A CABLE MANUFACTURER'S RECOGNIZED SPECIAL TOOL. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO FURNISH ANY SPECIAL INSTALLATION EQUIPMENT OR TOOLS NECESSARY TO PROPERLY COMPLETE THE SYSTEM. THIS MAY INCLUDE, BUT IS NOT LIMITED TO, TOOLS FOR TERMINATING CABLES, TESTING AND SPLICING EQUIPMENT FOR COPPER/FIBER CABLES, COMMUNICATION DEVICES, JACK STANDS FOR CABLE REELS, OR CABLE WINCHES.

10. UNDER NO CIRCUMSTANCE ARE "CHANNEL LOCKS" OR OTHER PLIERS NOT DESIGNED BY THE SCS MANUFACTURE TO BE USED TO TERMINATE WAO JACKS.

#### B. TECHNOLOGY PATHWAY NOTES:

- PATHWAYS CAN BE DIVIDED UP INTO TWO SEPARATE CATEGORIES, OUTSIDE PLANT (OSP) AND INSIDE PLANT (ISP). IT IS THE SCS AND/OR LV SYSTEM(S) CONTRACTOR'S RESPONSIBILITY TO IDENTIFY ALL EXISTING PATHWAYS (CONDUIT, CABLE TRAY, ETC) THAT WILL BE UTILIZED ON THE PROJECT, AND COORDINATE WITH THE ON-SITE ELECTRICAL OR GENERAL CONTRACTOR TO PROVE ALL PATHS SUBJECT TO BE USED ON THIS PROJECT, BEFORE INSTALLATION. THE <u>ELECTRICAL CONTRACTOR</u> IS RESPONSIBLE FOR THE INSTALLATION ALL UNDERGROUND (OSP) PATHWAYS, NON-ACCESSIBLE AND OPEN CEILING SPACE PATHWAYS AS DESCRIBED IN SECTION G, CONTRACTOR GUIDELINES OF THESE TECHNOLOGY GENERAL NOTES.
- ALL PULLBOXES SHALL BE SIZED AND INSTALLED PER ANSI/TIA-569-D. PULLBOXES FOR IN/UNDER SLAB CONDUIT RUNS ARE NOT PERMITTED UNLESS OTHERWISE NOTED. PULLBOXES FOR OVERHEAD CONDUIT RUNS SHALL BE LOCATED ABOVE ACCESSIBLE CEILINGS WITHIN THE ACCESSIBLE CEILING SPACE AND SUPPORTED INDEPENDENTLY FROM THE STRUCTURE AND CONDUIT SUPPORTS. PULLBOXES FOR ROOF MOUNTED OR EXTERIOR ABOVE GRADE APPLICATIONS SHALL BE NEMA 3R RATED. PULLBOXES SHALL BE SIZED ACCORDING TO THE FOLLOWING:

## **PULLBOX SIZING PER ANSI/TIA 569-D**

Condui t Size	WIDTH	LENGTH	DEPTH	WIDTH INCREASE PER ADDITIONAL
1"	4"	15"	3"	2"
2"	8"	36"	4"	5"
3"	61	48"	5"	6"
4"	101	60"	8"	8"

FOR FILL RATIO BASED CONDUIT SIZING REFER TO THE FILL RATIO TABLE 1A - 2B BELOW AND REFERENCE TO ANSI/TIA-569-D.

## **FILL RATIO TABLE 1A - Conduit**

Conduit Size	.13	.18	.19	.20	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30	.31	.32	.33	.34	.35	.37	.3
3/4"	16	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2	2	2	1	1
1"	26	13	12	11	9	9	8	7	7	6	6	5	5	4	4	4	4	3	3	3	2
1 1/4"	45	23	21	19	17	15	14	13	12	11	10	9	9	8	7	7	6	6	6	5	
1 1/2"	61	32	28	25	23	21	19	18	16	15	14	13	12	11	10	10	9	8	8	7	(
2"	101	52	47	42	38	35	32	29	27	25	23	21	20	18	17	16	15	14	13	12	1
2 1/2"	176	92	82	74	67	61	56	51	47	44	40	38	35	33	31	29	27	25	24	21	1
3"	266	139	124	112	102	93	85	78	72	66	61	57	53	50	46	43	41	38	36	32	2
3 1/2"	347	181	162	146	133	121	111	102	94	86	80	74	69	65	61	57	53	50	47	42	3
4"	444	231	208	187	170	155	142	130	120	111	103	95	89	83	78	73	68	64	61	54	4

Conduit Size	.41	.45	.49	.51	.55	.59	.61	.65	.69	.71	.75	.79	.85	.98	1.00	1.32	1.58	1.79	2.18	2.63	3.00 (47%)
3/4"	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1"	2	2	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
1 1/4"	4	3	3	2	2	2	2	1	1	1	1	1	1	-	-	-	-	-	-	-	-
1 1/2"	6	5	4	3	3	2	2	2	2	2	1	1	1	1	1	-	-	-	-	-	-
2"	10	8	7	6	5	4	4	4	3	3	3	2	2	1	1	-	-	-	-	-	-
2 1/2"	17	14	12	11	9	8	8	7	6	5	5	4	4	3	2	1	1	-	-	-	-
3"	26	22	18	17	14	12	12	10	9	8	8	7	6	4	4	2	1	-	-	-	-
3 1/2"	34	29	24	22	19	16	15	13	12	11	10	9	8	6	5	3	2	1	1	-	-
4"	44	37	31	28	24	21	20	17	15	14	13	12	10	7	7	4	3	2	1	1	1

Tray Size (WxD)	.13	.18	.19	.20	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30	.31	.32	.33	.34	.35	.37	.39
4x4	482	251	225	203	184	168	154	141	130	120	111	103	96	90	84	79	74	70	66	59	53
6x4	723	377	338	305	277	252	231	212	195	180	167	155	145	135	127	119	112	105	99	89	80
12x4	1447	754	677	661	554	505	462	424	391	361	335	311	290	271	254	238	224	211	199	178	160
18x4	2170	1132	1016	917	831	758	693	636	587	542	503	467	436	407	381	358	336	317	299	267	24
24x4	2894	1509	1355	1222	1109	1010	924	849	782	732	671	623	581	543	509	477	449	423	399	357	32
6x6	1085	566	508	458	415	379	346	318	293	271	251	233	218	203	190	179	168	158	149	133	120
12x6	2170	1132	1016	917	831	758	693	636	587	542	503	467	436	407	381	358	336	317	299	267	24
18x6	3256	1698	1524	1375	1247	1137	1040	955	880	814	754	701	654	611	572	537	505	476	449	401	36
24x6	4341	2264	2032	1834	1663	1516	1387	1273	1174	1085	1006	935	872	815	763	716	673	634	598	535	48
FILL RATIO						Baske															3.0
(WxD)	.41	.45	.49	.51	.55	.59	.61	.65	.69	.71	.75	.79	.85	.98	1.00	1.32	1.58	1.79	2.18	2.63	(47
4x4	48	40	33	31	26	23	21	19	17	16	14	13	11	8	8	4	3	2	-	-	-
6x4	72	60	50	47	40	35	32	28	25	24	21	19	16	12	12	7	4	3	2		

4x4	48	40	33	31	26	23	21	19	17	16	14	13	11	8	8	4	3	2	-	-	-
6x4	72	60	50	47	40	35	32	28	25	24	21	19	16	12	12	7	4	3	2	-	-
12x4	145	120	101	94	80	70	65	57	51	48	43	39	33	25	24	14	9	7	5	3	2
18x4	218	181	152	141	121	105	98	86	77	72	65	58	50	38	36	21	14	11	7	5	4
24x4	291	241	203	188	161	140	131	115	102	97	86	78	67	50	48	28	19	15	10	7	5
6x6	109	90	76	70	60	52	49	43	38	36	32	29	25	19	18	10	7	5	-	-	-
12x6	218	181	152	141	130	105	106	86	77	72	65	58	50	38	36	21	14	11	7	5	4
18x6	327	271	229	211	181	158	147	130	115	109	97	88	76	57	55	31	22	17	11	7	6
24x6	436	362	305	282	242	210	197	173	154	145	130	117	101	76	73	42	29	22	15	10	8

# FOR FILL RATIO BASED CONDUIT SIZING REFER TO THE FILL RATIO TABLE 1A - 2B BELOW AND REFERENCE TO ANSI/TIA-569-D

# PATHWAY SEPARATION FROM SOURCE OF ELECTROMAGNETIC ENEGRY:

CONDITION	<2KVA	2-5 KVA	>5KVA
Unshielded Power Lines in Proximity to open PVC Pathways	5" (ln.)	12" (ln.)	24" (In.)
Unshielded Power Lines in Proximity to Grounded Metallic Pathways	2.5" (ln.)	6" (In.)	12" (ln.)
Power Lines enclosed in Metal Grounded Pathways in proximity to Grounded Metallic	<1" (In.)	3" (In.)	6" (In.)

### B. TECHNOLOGY PATHWAY NOTES: (CONT.)

HOLES, PULLBOXES, AND CONDUITS.

- FOR ALL FIRESTOPPING OF SCS AND LV SYSTEMS PATHWAY RESPONSIBILITIES REFERENCE SECTION G, PENETRATION OF WALLS, FLOOR AND CEILINGS OF THESE TECHNOLOGY GENERAL NOTES. 4. FOR ALL OTHER SCS AND/OR LV SYSTEMS PATHWAY RESPONSIBILITIES REFERENCE SECTION F, CONTRACTOR GUIDELINES OF THESE TECHNOLOGY GENERAL NOTES.
- OUTSIDE PLANT (OSP) PATHWAYS CAN BE BROKEN DOWN INTO THE FOLLOWING ITEMS, MAINTENANCE HOLES, HAND
- WHILE ENTERING MAINTENANCE HOLES, HAND HOLES, PULLBOXES, FOLLOW ALL CODES AND SAFETY PRACTICES OF A "CONFINED SPACE". UTILIZE NECESSARY EQUIPMENT TO MAINTAIN ALL SAFE PULLING TENSIONS FOR THE CABLES TO BE INSTALLED. THIS INFORMATION CAN BE FOUND ON THE CABLE MANUFACTURER'S SPECIFICATIONS SHEETS.
- BEFORE EXITING THE MAINTENANCE HOLE, HAND HOLE, PULLBOX, NOTE ON PAPER OR DIGITAL MEANS THE EXISTING AND NEW CABLE(S) LOCATION(S) AND ROUTE(S), AND PROVIDE A "BUTTERFLY" PRINT TO AHJ AND OWNER'S REPRESENTATIVE. LABEL THE INSTALLED MEDIA PER SPECIFICATIONS.
- WITH DIRECTION OF OWNER OR OWNER'S REPRESENTATIVE, CHOOSE AND PROVE ALL CONDUITS BEFORE THE INSTALLATION OF THE MEDIA. MEASURE ALL PATHWAYS WITH MULE-TAPE PRIOR TO ORDERING MATERIAL. ALL LABOR AND MATERIAL COSTS ASSOCIATED WITH DISCREPANCIES BETWEEN DRAWINGS AND VERIFIABLE SITE CONDITIONS SHALL BE BORNE BY CONTRACTOR, COORDINATE WITH THE ELECTRICAL OR GENERAL CONTRACTOR (EC OR GC), IF CONDUITS ARE PLUGGED OR MISSING PULL ROPE.
- TRAIL ALL BACKBONE MEDIA (I.E. COPPER, FIBER OR INNERDUCT) WITH A 3/8" YELLOW POLY-NYLON ROPE, LABEL THE ROPE, AND TIE OFF EITHER END, FOR FUTURE INSTALLATIONS.
- PROVIDE AND INSTALL ALL HARDWARE NECESSARY TO SUPPORT THE CABLING TO THE WALLS OF THE MAINTENANCE HOLE, HAND HOLES, PULLBOX. (IF IT DOES NOT ALREADY EXIST) THIS HARDWARE IS TO BE CONSTRUCTED FOR THE AREA IT IS TO BE INSTALLED AND DESIGNED FOR THE PURPOSE INTENDED FOR ITS
- SCS AND/OR LV CONTRACTOR TO PROVIDE EXPANSION PLUGS IN ALL DUCTS/CONDUITS ENTERING THE BUILDING. SEAL ALL UNUSED DUCTS/CONDUITS WITH PLUGS THAT ALLOW THE PULL-STRING TO BE TIED OFF
- INSIDE PLANT (ISP) PATHWAYS CAN BE BROKEN DOWN INTO THE FOLLOWING ITEMS, HOLLOW WALL PENETRATION, MEMBRANE PENETRATION, ACCESSIBLE CEILING (I.E. "J" HOOKS), AND CONDUIT.
- CABLE RACEWAYS AND CONDUITS SHALL NOT BE FILLED GREATER THAN THE NEC 2017, ARTICLE 725 AND BICSI RECOMMENDED FILL FOR THE PARTICULAR RACEWAY OR CONDUIT SIZE FOR CLASS 2/3 WIRE/CABLE.
- CONDUIT AND PATHWAY ROUTING SHOWN FOR THE SCS AND LV SYSTEMS ARE STRICTLY DIAGRAMMATICAL FOR THE PURPOSE OF THE BID TO ILLUSTRATE GENERAL METHODOLOGY. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO DETERMINE THE BEST MEANS & METHODS FOR SCS & TECHNOLOGY CONDUIT AND PATHWAY INSTALLATION. ADDITIONALLY IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO COORDINATE THE INSTALLATION PLAN WITH THE OWNERS REPRESENTATIVE AND ALL TRADES PRIOR TO INSTALLATION. REFER TO PLANS AND GENERAL ELECTRICAL SPECIFICATION FOR ADDITIONAL REQUIREMENTS. F.
- CONDUIT PATHWAYS SHALL BE SUPPLIED BY THE ELECTRICAL OR GENERAL CONTRACTOR AS PER THE DRAWINGS, OTHER CONDUITS (IF ANY) MAY NEED TO BE COORDINATED WITH THE EC AND/OR GC OF THE
- NO CABLE IS TO BE PULLED THROUGH A CONDUIT L-BEND "LB" (CONDULETS).
- ALL EXPOSED CONDUIT AND HARDWARE SHALL BE PAINTED TO MATCH SURROUNDING SURFACES. CONTRACT DISTRICT REPRESENTATIVE FOR PAINT COLORS.
- CONDUITS SHALL CONTAIN PLASTIC OR NYLON PULL TAPE RATED AT 200 LBS. WITH A MINIMUM OF 5 FEET OF EXTRA PULL TAPE COILED AT EACH END.
- TERMINATE CONDUIT STUBS AND SLEEVES THAT PROTRUDE THROUGH STRUCTURAL FLOORS 2"-3" ABOVE THE
- INSTALL BUSHINGS AND BELL ENDS AS REQUIRED ON ALL CONDUITS.
- FLEX CONDUIT IS UNACCEPTABLE FOR USE AS A COMMUNICATIONS CONDUIT EXCEPT AT SEISMIC JOINTS AND/OR IF APPROVED IN WRITING BY THE ENGINEER.
- ALL UNDER SLAB OR IN-SLAB CONDUITS SHALL BE INSTALLED IN A MANNER THAT PREVENTS WATER INFILTRATION OF THE CONDUIT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE GROUND WATER, RAIN WATER OR CONSTRUCTION WATER IS PREVENTED FROM ENTERING AND/OR REMOVED FROM THE CONDUITS PRIOR TO PLACEMENT OF COMMUNICATIONS CABLES. SEE ELECTRICAL SPECIFICATIONS, DETAILS AND PLANS FOR ADDITIONAL CONDUIT SEALING REQUIREMENTS.
- PROVIDE LABELING OF EACH CONDUIT PER GENERAL ELECTRICAL SPECIFICATIONS.
- REINSTALL PULL-STRINGS IN ALL SCS AND LV ISP PATHWAYS AFTER USE TO FACILITATE FUTURE ADDITION OF
- IT IS THE SCS AND/OR LV CONTRACTOR'S RESPONSIBILITY TO REPORT ANY UNUSABLE OR INADEQUATE CONDUIT RUNS TO THE OWNER PRIOR TO PULLING ANY CABLE.
- PULL BOXES ARE NOT TO BE USED IN LIEU OF A BEND, AND THE CONDUIT SHALL EXIT A PULLBOX ON THE WALL OPPOSITE THE WALL ENTERED.
- n. CONDUITS SHALL
  - CONTAIN NO CONTINUOUS SECTIONS LONGER THAN 30M (98 FT.)
  - CONTAIN NO MORE THAN (2) 90° BENDS OR (1) REVERSE BEND WITHOUT INSTALLING A PULLBOX SIZED
- SPLIT CONDUITS IN PLACE OF PULLBOXES ARE UNACCEPTABLE.
- CONDUIT BEND RADIUS SHALL BE;
- A MINIMUM OF 6 TIMES THE INTERNAL CONDUIT DIAMETER FOR CONDUITS 2" IN DIAMETER OR LESS.
- A MINIMUM OF10 TIMES THE INTERNAL CONDUIT DIAMETER FOR CONDUITS MORE THAN 2" IN DIAMETER. POWER SEPARATION:
- THE CONTRACTOR SHALL NOT PLACE ANY DISTRIBUTION CABLING ALONGSIDE POWER LINES, OR SHARE THE SAME CONDUIT. CHANNEL OR SLEEVE WITH ELECTRICAL APPARATUS. AT NO POINT SHALL THE COMMUNICATIONS CABLES BE TIED TO POWER CABLES OR OTHER BUILDING SERVICES. STATION CABLES AND TIE CABLES INSTALLED WITHIN CEILING SPACES SHALL BE ROUTED THROUGH THESE SPACES AT RIGHT ANGLES TO ELECTRICAL POWER CIRCUITS.
- AVOID ELECTROMAGNETIC INTERFERENCE (EMI) BY MAINTAINING ADEQUATE PHYSICAL SEPARATION BETWEEN TECHNOLOGY CABLING AND POSSIBLE SOURCES SUCH AS. BUT NOT LIMITED TO. ELECTRIC MOTORS, ELECTRIC PENCIL SHARPENERS, TRANSFORMERS, FLUORESCENT LIGHTS THAT SHARE DISTRIBUTION SPACE WITH TELECOMMUNICATIONS CABLING, COPIERS THAT SHARE WORK AREA SPACE WITH LINE CORDS AND TERMINALS, LARGE FAX MACHINES AND POWER CORDS THAT SUPPORTS SUCH G. FOUIPMENT

# C. TECHNOLOGY CABLING NOTES:

- THE USE OF LUBRICANTS SUCH AS CLEAR GLIDE. TO FACILITATE THE INSTALLATION OF CABLES IN CONDUITS IS ENCOURAGED FOR FRICTION REDUCTION AND TO MAINTAIN THE REQUIRED PULL TENSION. YELLOW 77 AND POLYWATER IS NOT PERMISSIBLE FOR USE AS A LUBRICANT FOR ISP TECHNOLOGY CABLING. THE USE OF OSP, LOW TEMPERATURE CABLE LUBRICANTS SHALL NOT BE ACCEPTABLE IN AN INDOOR PLENUM ENVIRONMENT. UNDER NO CIRCUMSTANCES SHALL CABLE PULLING LUBRICANT BE ALLOWED TO ACCUMULATE ON WALLS, FLOORS, BACKBOARDS, OR OTHER SURFACES OUTSIDE THE CONDUIT.
- ANY CABLE DAMAGED OR EXCEEDING RECOMMENDED INSTALLATION PARAMETERS DURING INSTALLATION SHALL BE REPLACED BY THE CONTRACTOR BEFORE FINAL ACCEPTANCE AT NO COST TO THE OWNER.
- EACH RUN OF CABLE BETWEEN THE TERMINATION BLOCK OR PATCH PANEL AND THE STATION CONNECTOR SHALL BE CONTINUOUS WITHOUT ANY JOINTS OR SPLICES.
- ALL STATION CABLE SHALL BE PLACED IN THE INTERIOR OF WALLS UNLESS OTHERWISE NOTED OR OBSTRUCTED. PROVIDE BUSHINGS, GROMMETS AND STRAIN-RELIEF FOR CABLES TERMINATING AT WALL-MOUNTED OUTLETS AND PATCH PANELS TO ENSURE DURABLE AND ROBUST CONNECTIONS. THE BUSHINGS AND GROMMETS ARE INTENDED TO PROTECT THE CABLES FROM ANY SHARP EDGES THAT PRESENT A RISK TO THE CABLES. ENSURE THAT ALL SHARP
- ALL CABLE BUNDLES EXITING FLOOR OR WALL PENETRATIONS AND RUNNING INTO FURNITURE OR CASEWORK SHALL BE WRAPPED IN SPIRAL WRAP OR SPLIT-LOOM TUBING TO PROTECT THE CABLING AND PROVIDE A NEAT INSTALLATION.
- 7. ALL CABLE OR INNERDUCT SHALL RUN PARALLEL OR AT RIGHT ANGLES TO BUILDING WALL STRUCTURES.

EDGES ARE COVERED TO PROTECT THE CABLES FROM DAMAGE.

- IN SUSPENDED CEILING AND RAISED FLOOR AREAS WHERE DUCT. CABLE TRAYS OR CONDUIT ARE NOT AVAILABLE. CABLE BUNDLES SHALL BE SUPPORTED VIA "J" HOOKS ATTACHED TO THE BUILDING STRUCTURE AND FRAMEWORK AT A MAXIMUM OF FIVE (5) FOOT INTERVALS. MINIMUM 1" WIDE J-HOOKS SHALL BE APPROPRIATELY SIZED TO ALLOW A MINIMUM OF 60% SPARE CAPACITY FOR FUTURE CABLE INSTALLATION. THE CONTRACTOR SHALL INCLUDE ALL COSTS IN BASE BID FOR ANY ADDITIONAL SUPPORTS/SEISMIC BRACING REQUIRED BY THE LOCAL AUTHORITY HAVING
- THE CONTRACTOR SHALL BUNDLE. IN BUNDLES OF 48 OR LESS. STATION OR OTHER CABLING WITH 3/4" HOOK AND LOOP "VELCRO" STRIPS TIGHT ENOUGH TO HOLD THE BUNDLE TOGETHER IN A CYLINDRICAL SHAPE, BUT NOT SO TIGHT AS TO DEFORM THE CABLE GEOMETRY. IT SHALL BE POSSIBLE TO COMPLETELY ROTATE ALL HOOK AND LOOP TIES AROUND ALL CABLE BUNDLES. PLENUM RATED HOOK AND LOOP TIES WILL BE USED IN ALL PLENUM AREAS.
- CABLES OR J-HOOKS SHALL NOT BE ATTACHED TO LIFT OUT CEILING GRID SUPPORTS OR LAID DIRECTLY ON THE CEILING GRID.
- CABLES OR J-HOOKS SHALL NOT BE ATTACHED TO OR SUPPORTED BY FIRE SPRINKLER HEADS OR DELIVERY SYSTEMS
- WHERE ADDITIONAL CONDUIT(S)/SLEEVE(S) ARE REQUIRED, BUT NOT PROVIDED BY THE ELECTRICAL CONTRACTOR. THE SCS AND/OR LV CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE SUCH CONDUIT(S)/SLEEVE(S). CONDUIT(S) AND SLEEVE(S) SHALL BE OF SUITABLE MATERIAL, SIZED, INSTALLED, FIRE-STOPPED, AND GROUNDED AS REQUIRED BY THE NEC 2017, ANSI/TIA-569-D STANDARD AND ALL OTHER APPLICABLE CODES AND STANDARDS. SLEEVES SHALL CONSIST OF METALLIC CONDUIT DE-BURRED AND GROMMETTED ON BOTH ENDS WITH FLANGES OR OTHER MEANS TO PREVENT THE SLEEVE FROM SLIPPING OR FALLING OUT OF THE PARTITION. SLEEVES SHALL EXTEND A MINIMUM OF 6" ON BOTH SIDES OF THE PARTITION. OUTSIDE PERIMETER OF SLEEVES SHALL BE SEALED AGAINST SOUND, AIR. WATER, HEAT, OR AS REQUIRED BY PARTITION DESIGN. INSIDE OF SLEEVE SHALL BE SEALED SIMILARLY AFTER INSTALLATION OF ALL CABLING. CABLES SHALL BE INDEPENDENTLY SUPPORTED ON EITHER SIDE OF THE SLEEVE. SLEEVES SHALL NOT BE USED AS CABLE SUPPORTS. ANY CONDUIT(S) AND SLEEVE(S) ADDED BY THE SCS
- CONTRACTOR SHALL BE APPROVED BY THE OWNERS REPRESENTATIVE PRIOR TO ROUGH-IN. 13. IN THE EVENT CONTRACTOR IS REQUIRED TO REMOVE CEILING TILES, SUCH WORK SHALL NOT BREAK OR DISTURB GRID. REMOVAL OF THE CEILING GRID MUST BE COORDINATED WITH THE OWNERS REPRESENTATIVE. ALL INSULATION SHALL BE REPLACED IN ITS ORIGINAL LOCATION.
- THE NUMBER OF CABLES IN EACH CONDUIT SHALL BE CONTROLLED TO ALLOW FOR FUTURE CABLE INSTALLATION AND TO STAY WITHIN THE MANUFACTURER'S MAXIMUM ALLOWABLE CABLE PULLING TENSION. CONDUIT FILL RATIOS SHALL NOT EXCEED THE CURRENT REQUIREMENTS OF THE NEC 2017, ANSI/TIA-569-D, REFERENCE SECTION B.2, TABLES 1 AND 2 OF THIS DOCUMENT FOR ADDITIONAL REQUIREMENTS.
- 15. CONDUITS: ALL BACKBONE CABLING WILL RUN THROUGH DEDICATED CONDUITS.

OR ANY ENVIRONMENTAL SENSOR LOCATED IN THE CEILING AIR SPACE.

- ALL NEW CONDUITS WILL BE SUPPLIED WITH A PULL STRING BY THE ELECTRICAL CONTRACTOR. EXISTING CONDUITS SHALL BE PROVEN TO BE CLEAR BY THE SCS AND/OR LV CONTRACTOR PRIOR TO PULLING SCS AND/OR LV CONTRACTOR SHALL SUPPLY PULL STRING AND PULL ROPE FOR THE INSTALLATION OF ALL
- CABLES IN EXISTING CONDUITS. FOR ALL CONDUITS LEFT WITH AVAILABLE CAPACITY, SCS AND/OR LV CONTRACTOR SHALL REPLACE PULL STRINGS DURING THE COURSE OF HIS WORK.

SCS AND/OR LV CONTRACTOR MUST SEAL ALL CONDUITS WITH AN APPROVED SEALING COMPOUND.

- TECHNOLOGY GROUNDING SYSTEM NOTES.
  - THE ELECTRICAL CONTRACTOR SHALL PROVIDE A TELECOMMUNICATION GROUNDING BUSSBAR (TGB) AND TELECOMMUNICATION BONDING BACKBONE (TBB) CABLE(S) AT EACH MDF ROOM AND IDF LOCATION. TERMINATE THE TBB ON GROUND BARS LOCATED AT EACH MDF ROOM AND IDF CABINET FROM BUILDING STEAL OR MAIN ELECTRICAL GROUND, OR AS OTHERWISE INDICATED ON THE DRAWINGS.
  - THE SCS CONTRACTOR SHALL UTILIZE A TELECOMMUNICATIONS BONDING BACKBONE (TBB) AS INDICATED IN THE DRAWINGS. GROUNDING MUST BE IN ACCORDANCE WITH THE NEC 2017, ANSI/TIA-607-B AND ALL LOCAL CODES AND PRACTICES.
  - THE SCS CONTRACTOR SHALL BE RESPONSIBLE FOR BONDING ALL METALLIC SHEATH COMMUNICATIONS CABLES ENTERING THE BUILDING PER MANUFACTURER SPECIFICATIONS AND NEC 770-33, 800-33 AND 800-40. ALL GROUNDS SHALL CONSIST OF #6-AWG COPPER WIRE AND SHALL BE SUPPLIED FROM AN APPROVED BUILDING GROUND AND BONDED TO THE MAIN ELECTRICAL GROUND. ALL CABLE SHEATHS AND SPLICE CASES SHALL BE GROUNDED TO A TELECOMMUNICATIONS GROUND BUS.
  - THE SCS CONTRACTOR SHALL PROVIDE GROUNDING AND BONDING FROM ALL HORIZONTAL EQUIPMENT INCLUDING DISTRIBUTION AND CROSS CONNECT FRAMES, PATCH PANELS, CABLE TRAYS, EQUIPMENT RACKS, LADDER TRAYS, CONDUITS, ACTIVE TELECOMMUNICATION EQUIPMENT, SLEEVES, TEST APPARATUS. EQUIPMENT SHALL BE BONDED TO THE TBB GROUND BARS UTILIZING A #6-AWG GREEN CONDUCTOR WITH 2-HOLE LONG BARREL COMPRESSION GROUNDING LUGS.
  - EACH EQUIPMENT CABINET AND RACK REQUIRES ITS OWN DEDICATED RACK GROUNDING BUSBAR (RGB) WITH A BONDING CONNECTION TO THE GROUNDING INFRASTRUCTURE. THE GROUNDING INFRASTRUCTURE CONSIST OF A TBB, BY PROVIDING EVERY RACK/CABINET WITH ITS OWN DEDICATED #6 AWG (MIN.) GREEN CONDUCTORS BACK TO THE TMGB/TGB. ALL GROUND CONDUCTOR ATTACHMENTS SHALL UTILIZE 2-HOLE LONG BARREL COMPRESSION LUGS.
  - HORIZONTAL CABLES SHALL BE GROUNDED IN COMPLIANCE WITH ANSI/TIA-607-C, NFPA 70 (NEC) AND LOCAL REQUIREMENTS AND PRACTICES.
  - IN RAISED-FLOOR ENVIRONMENTS, THE GROUND CONDUCTOR SHALL ATTACH TO THE LOWEST HOLES ON THE FRONT RAIL OF EACH RACK/CABINET.
  - RACK MOUNTED EQUIPMENT SHALL BE GROUNDED VIA THE CHASSIS, IN ACCORDANCE WITH MANUFACTURER'S
  - BONDING OF LADDER RACK SECTIONS: ATTACH BONDING STRAPS TO EACH LADDER RACK SECTION BY UTILIZING EITHER TWO (2) TRI-LOBULAR THREAD-FORMING SCREWS (NOT SELF-TAPPING OR SHEET METAL SCREWS) OR BY USING TWO (2) STANDARD BOLTS WITH TWO (2) "TYPE B" INTERNAL / EXTERNAL TOOTH LOCK WASHERS PER BOLT. IF THREAD-FORMING SCREWS ARE NOT USED, REMOVE PAINT AT EACH CONNECTION POINT AND USE AN APPROVED ANTI-OXIDANT PRIOR TO ATTACHING THE BONDING STRAP.

#### TERMINAL BACKBOARDS NOTES.

WHERE INDICATED ON DRAWINGS, ELECTRICAL CONTRACTOR TO PROVIDE NEW PLYWOOD TERMINAL BACKBOARDS. USE DOUGLAS FIR PLYWOOD, INTERIOR A/C GRADE, FINISHED ONE SIDE AND PRIME COAT PAINTED ON ALL SURFACES WITH A FINISH COAT OF FIRE RETARDANT WHITE ENAMEL. ON EACH PLYWOOD SHEET LEAVE ONE (1) FIRE MARSHAL STAMP UNPAINTED FOR INSPECTION. UNLESS OTHERWISE INDICATED, USE 8'-0" HIGH X LENGTH AS SHOWN ON DRAWINGS X 3/4" THICK PLYWOOD. REFERENCE BACKBOARD ELEVATIONS FOR MORE INFORMATION.

## PENETRATIONS OF WALLS, FLOORS AND CEILINGS NOTES

ACCOMPLISH THESE DIFFERENT TYPES:

- UNLESS SPECIFICALLY SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL MAKE NO PENETRATION OF FLOORS, WALLS OR CEILING WITHOUT THE PRIOR WRITTEN APPROVAL OF THE OWNERS REPRESENTATIVE.
- WALL PENETRATIONS:
  - THE SCS AND/OR LV CONTRACTOR SHALL PROVIDE FIRE STOPPING FOR ALL COMMUNICATIONS RATED (AND IN SOME CASES NON-RATED, THAT WILL BE DESCRIBED BELOW THIS SECTION) PATHWAYS AND SPACES. THESE FIRE STOPPING DEVICES SHALL CONFORM TO (BUT NOT LIMITED TO) UL 1479, ASTM E814, BICSI TDMM, FIRE STOPPING ANSI/TIA-568-C, STANDARD FOR INSTALLING COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING, SECTION 5, CLAUSE 5.1 THROUGH 5.2.3, MANUFACTURES GUIDELINES OR OTHER PREVAILING CODE AND MUST BE AN APPROVED UL LISTED
  - CABLE TRAY FIRE-STOPPING SHALL UTILIZE THE MULTI GANG FIRE-STOPPING SYSTEM THAT WILL BE ABLE TO STACK THE UNITS HORIZONTALLY AND/OR VERTICALLY IF REQUIRED DUE TO CURRENT AND/OR FUTURE CABLING DESIGNS.
  - THE CONTRACTOR SHALL INSTALL PENETRATION FIRE-STOP SEAL MATERIALS IN ACCORDANCE WITH DESIGN REQUIREMENTS, AND MANUFACTURER'S INSTRUCTIONS.
  - THE CONTRACTOR'S INSTALLER SHALL BE CERTIFIED, LICENSED OR OTHERWISE QUALIFIED BY THE FIRE-STOPPING MANUFACTURER AS HAVING BEEN PROVIDED THE NECESSARY TRAINING TO INSTALL MANUFACTURER'S PRODUCTS PER SPECIFIED REQUIREMENTS.
  - ALL THROUGH-PENETRATION SHALL BE A MANUFACTURED, UL CLASSIFIED, FIRE-STOP DEVICE / SYSTEM DESIGNED TO ALLOW CABLES TO PENETRATE FIRE-RATED WALLS WITH A BUILT-IN FIRE SEALING SYSTEM THAT AUTOMATICALLY
  - ADJUSTS TO THE AMOUNT OF CABLES INSTALLED. THE FIRE-STOPPING DEVICE SHALL BE CAPABLE OF INSTALLATION IN NEW CONSTRUCTION OR RETROFIT IN EXISTING STRUCTURES. THE CONTRACTOR MUST NOT USE CONCRETE OR OTHER NON-REMOVABLE SUBSTANCE FOR FIRE STOPPING ON CABLE TRAYS, WIREWAYS OR CONDUITS. CONTRACTORS WHO USE THIS METHOD WILL BE REQUIRED TO REPLACE ALL CABLES AFFECTED AND PROVIDE THE ORIGINAL SPECIFIED ACCESS TO EACH EFFECTED AREA. THIS REQUIREMENT

ALSO APPLIES TO MAINTAINING FIRE RATINGS OF ALL FLOORS PENETRATED BY CONDUITS OR DEVICES DESIGNATED

WITH ACOUSTIC PROPERTIES. NON-RATED. AND NON-RATED WITH ACOUSTIC PROPERTIES. BELOW ARE METHODS TO

- FOR USE BY VOICE AND DATA CABLING. ANY PENETRATIONS THROUGH FIRE-RATED WALLS FOR CABLE PATHWAYS / CABLES SHALL BE SEALED BY USE OF A NON-PERMANENT FIRE BLANKET OR OTHER METHOD IN COMPLIANCE. THE CONTRACTOR MUST USE FIRE STOPPING ON CABLE TRAYS, WIREWAYS AND CONDUITS EITHER VERTICAL OR HORIZONTAL. FOUR DIFFERENT METHODS OF FIRE-STOPPING HAVE BEEN IDENTIFIED FOR THE HORIZONTAL THROUGH PENETRATIONS BETWEEN WALLS, RATED, RATED
- SEALING OF RATED OPENINGS BETWEEN FLOORS OR THROUGH RATED WALLS, WHETHER EXISTING OR CREATED BY THE CONTRACTOR FOR PLACEMENT OF CABLE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SEALING MATERIAL AND APPLICATION SHALL BE AN APPROVED UL LISTED SYSTEM AND SHALL BE ACCOMPLISHED IN SUCH A MANNER THAT IS ACCEPTABLE TO THE LOCAL FIRE AND BUILDING AUTHORITIES HAVING JURISDICTION OVER THIS WORK. CREATION OF SUCH OPENINGS AS ARE NECESSARY FOR CABLE PASSAGE BETWEEN LOCATIONS AS SHOWN ON THE DRAWINGS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ANY OPENINGS CREATED BY OR FOR THE CONTRACTOR AND LEFT UNUSED SHALL ALSO BE SEALED AS PART OF THIS WORK.
- RATED WALLS WITH THROUGH PENETRATIONS WITH ACOUSTIC PROPERTIES SHALL BE INSTALLED WITH FACTORY MANUFACTURED DEVICE. SUCH AS A STI "EZ PATH" OR WIREMOLD "FLAMESTOPPER" OR EQUAL. THE TYPICAL STC RATING IS TO BE EQUAL TO OR GREATER THAN THE WALL PENETRATED, (AVG IS A RATING OF 44 STC PER UBC RATINGS).
- THAT WILL ALLOW FIRE-STOPPING TO BE INSTALLED IN THE FUTURE IF REQUIRED, (I.E. WIREMOLD "FLAMESTOPPER" OR EQUAL). A NON-RATED PATHWAY WITH ACOUSTIC PROPERTIES CAN BE FOUND IN AREAS SUCH AS, CONFERENCE ROOMS, HUMAN RESOURCE OFFICES, MEDICAL EXAMINATION ROOMS ETC. THESE ROOMS REQUIRE TO LIMIT

NON-RATED PATHWAY, ALTHOUGH NOT REQUIRED TO BE FIRE-STOPPED, SHALL BE A MANUFACTURED DEVICE

THE AMOUNT OF AMBIENT NOISE THAT CAN TRAVEL FROM ONE ROOM TO THE OTHER THROUGH THE CEILING

GRID. IF THIS WALL IS PENETRATED, INSTALL A SYSTEM THAT WILL RE-ESTABLISH THE STC RATING OF THE

### WALL, THE TYPICAL STC RATING IS AN AVERAGE OF 44 STC PER UBC RATINGS. CONTRACTOR(S) GUIDELINES.

- ALL TECHNOLOGY WORK SHALL COMPLY WITH APPLICABLE FEDERAL, STATE, AND LOCAL CODES. WHERE THE CONSTRUCTION DOCUMENTS INDICATE MORE RESTRICTIVE REQUIREMENTS, THE DOCUMENTS SHALL GOVERN BUT THE CONSTRUCTION DOCUMENTS SHALL NOT BE INTERPRETED AS AUTHORITY TO VIOLATE ANY CODE OR REGULATION.
- IN THE EVENT OF A CONFLICT OR INCONSISTENCY BETWEEN ITEMS INDICATED ON THE PLANS AND/OR SPECIFICATIONS OR WITH CODE REQUIREMENTS, THE NOTE, CODE OR SPECIFICATION WHICH PRESCRIBES AND ESTABLISHES THE MORE COMPLETE JOB OR THE HIGHER STANDARD SHALL PREVAIL. OMISSIONS FROM THE DRAWINGS OR SPECIFICATIONS OR THE MIS-DESCRIPTION OF DETAILS OF WORK WHICH ARE CLEAR
- AND NECESSARY TO CARRY OUT THE INTENT OF THE DRAWINGS AND SPECIFICATIONS, OR WHICH ARE CUSTOMARILY PERFORMED, SHALL NOT RELIEVE THE CONTRACTOR FROM PERFORMING SUCH OMITTED OR MIS-DESCRIBED DETAILS OF THE WORK BUT THEY SHALL BE PERFORMED AS IF FULLY AND CORRECTLY SET FORTH AND DESCRIBED IN THE DRAWINGS AND
- THE CONTRACTOR SHALL CHECK ALL DRAWINGS FURNISHED, IMMEDIATELY UPON THEIR RECEIPT AND SHALL PROMPTLY NOTIFY THE OWNER OF ANY DISCREPANCIES.
- ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BEAR THE UNDERWRITERS LABEL (UL) AND SHALL BE INSTALLED IN THE MANNER FOR WHICH THEY ARE DESIGNED AND APPROVED.
- THE CONTRACTOR SHALL NOT BORE, NOTCH OR IN ANY WAY CUT INTO ANY STRUCTURAL MEMBER WITHOUT WRITTEN APPROVAL FROM THE ARCHITECT OR STRUCTURAL ENGINEER.
- ALL CHANGES TO STRUCTURES (BUILDING, DRILLING, CORING, ETC.) NOT SHOWN ON THE DRAWINGS SHALL BE APPROVED IN WRITING BY STRUCTURAL ENGINEER.
- FOR PURPOSES OF CLEARNESS AND LEGIBILITY, THE TELECOM DRAWINGS ARE ESSENTIALLY DIAGRAMMATIC. THE SIZE AND LOCATION OF EQUIPMENT IS SHOWN TO SCALE WHEREVER POSSIBLE. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS, DATA INFORMATION AS INDICATED ON THE DRAWINGS AND IN THE SPECIFICATION SECTIONS WHERE SCS AND LOW VOLTAGE WORK INTERFACES WITH OTHER TRADES.
- THE CONTRACTOR SHALL MAINTAIN AS-BUILT DRAWINGS TO REFLECT ALL CHANGES MADE DURING CONSTRUCTION AND ANY DEVIATIONS FROM THE ELECTRICAL AND TECHNOLOGY DRAWINGS. THIS INCLUDES DEVIATIONS FROM OUTLET NUMBERS AND ANY ADDITION, DELETION OR RELOCATION OF OUTLETS SHOWN ON WORKING DRAWINGS, PATHWAY ADDITIONS, DELETIONS OR RELOCATIONS. THE CONTRACTOR SHALL AFTER COMPLETION OF JOB, PROVIDE THE OWNER AN ELECTRONIC AND HARD COPY OF AS-BUILT WORK.
- ANY DEVIATIONS FROM PLANS OR SPECS MUST BE APPROVED IN WRITING BY THE OWNER'S REPRESENTATIVE.
- 11. ALL FOOTAGES ON DRAWINGS ARE ESTIMATED AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO ORDERING MATERIAL. 12. ALL STATION CABLES SHALL BE NEATLY DRESSED AND SECURED EVERY FIVE FEET AT A MINIMUM.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF CEILING TILE INCLUDING REPLACEMENT OF
- ALL LOCATIONS PASSING THROUGH A FIRE OR A SMOKE BARRIER MUST BE FIRE STOPPED USING APPROVED (UL CLASSIFIED) FIRE STOP SYSTEM, INSTALLED PER THE MANUFACTURER'S INSTRUCTIONS AND PROPERLY LABELED.
- CONDUIT SHALL BE FILLED TO MAXIMUM CAPACITY (PER CODE, STANDARDS, AND NORMS) BEFORE UTILIZING ANOTHER VACANT CONDUIT.
- ALL STATION OUTLETS AND TERMINALS SHALL BE PROPERLY IDENTIFIED USING THE OWNER'S STANDARD INTERNAL DISTRIBUTION NUMBERING SCHEME. ALL LABELS SHALL BE PREPRINTED OR TYPED.

HOLE, AND PULL BOX, SHALL BE SO LABELED.

- EACH BACKBONE RISER AND/OR OSP CABLE SHALL BE EQUIPPED WITH A PERMANENT LABEL INDICATING CABLE TYPE, PAIR OR OPTIC COUNTS, DISTANT ENDS, AND CABLE LENGTH. BOTH ENDS OF EACH CABLE AND AT EVERY MAINTENANCE HOLE, HAND
- FIBER BACKBONE CABLE SHALL BE PLACED WITH 6 FOOT MAINTENANCE LOOP AT BOTH ENDS OF THE RUN. THE MAINTENANCE LOOP SHALL BE SECURED IN SUCH A MANNER TO PROVIDE PROTECTION DURING SUBSEQUENT CABLE PULLS.
- ALL STATION CABLES/OUTLETS SHALL BE TESTED AND DOCUMENTED USING A PAIR SCANNER SPECIFICALLY DESIGNED TO TEST THE TYPE OF CABLE INSTALLED (E.G. CATEGORY 6A). TEST RESULTS SHALL BE ONE PAGE PER AND NOTED WITH THE STATION/JACK NUMBERING SCHEME THAT IS STANDARDIZED FOR THE OWNER.
- ALL FIBER OPTIC STATION AND RISER CABLE SHALL BE TESTED END-TO-END AND THE RESULTS (LOSS IN dB) NOTED ON A SEPARATE TYPED SHEET.

FIBER CABLES SHALL BE SPLICED TOGETHER USING A FUSION SPLICE AND PLACED IN A FIBER SPLICE CASE THAT IS RE-

AFTER STATION CABLE IS TESTED AND DOCUMENTED, ONE PAIR FROM EACH VOICE STATION SHALL BE CROSS CONNECTED THROUGH EACH CLOSET BACK TO THE MAIN DISTRIBUTION FRAME. TELEPHONE NUMBER ASSIGNMENTS FOR EACH JACK MUST BE APPROVED BY THE TELECOM STAFF PRIOR TO IMPLEMENTATION. A WRITTEN RECORD OF ALL CROSS CONNECT ASSIGNMENTS WILL BE PROVIDED TO THE OWNER BY THE SCS CONTRACTOR.

ENTERABLE, FULLY DRESSED AND ENCLOSED TO FIT THE NUMBER AND TYPE OF CABLES TERMINATED.

- TECHNOLOGY CONTRACTOR(S) GUIDELINES. (CONT.)
- LADDER RACK SHALL BE PLACED IN MDF AND IDF(S) AS SHOWN ON DRAWINGS AND AS REQUIRED TO PROPERLY SECURE CABLES AND WIRE.
  - A BACKBONE CABLE ASSIGNMENT RECORD SHEET SHALL BE PREPARED (TYPED) PRIOR TO START OF ACCEPTANCE TESTING. ALL FLOOR PLANS SHALL BE NEATLY HAND NOTED WITH STATION JACK NUMBER AND
- ALL CABLES SHALL BE CLEARLY LABELED WITH CABLE NUMBERS, PAIR ASSIGNMENTS AND DESIGNATION.
- ALL CABLE TRAYS, LADDER RACKS, CONDUITS, EQUIPMENT RACKS, PROTECTOR PANELS, AND CABLE SHEATHS SHALL BE BONDED & GROUNDED TO EQUIPMENT GROUND WITH #6 WIRE (MIN.)
- ALL SPLICES SHALL BE CONTAINED WITHIN AN APPROVED SPLICE CASE DESIGNED FOR MULTIPLE CLOSURE.
- ALL SPLICES SHALL UTILIZE 3M 710 MODULES. ALL CABLES MUST BE EQUIPPED TO PROVIDE A CONTINUOUS BOUND OF CABLE SHIELDS THROUGH ALL SPLICES. PULL ROPES SHALL BE PLACED IN ALL VACANT CONDUITS.
- ALL WORK MUST BE COMPLETED IN A NEAT AND PROFESSIONAL MANNER. THE WORK SITE SHALL BE KEPT CLEAN AND ALL DAMAGE TO OWNER'S PROPERTY REPAIRED.
- CONTRACTOR SHALL REMOVE ALL COPPER, FIBER AND COAXIAL CABLES ABANDONED IN CONDUIT, CEILINGS AND WALLS PER NEC. CABLE SHALL INCLUDE ALL INTRABUILDING, RISER SYSTEMS AND STATION CABLES FOR
- 11. CONTRACTOR(S) SHALL VERIFY ALL SITE CONDITIONS PRIOR TO BID.

ALL LOW VOLTAGE/TECHNOLOGY/STRUCTURED CABLING SYSTEMS

12. IN ACCESSIBLE CEILING SPACES;

FINAL SYSTEM ACCEPTANCE.

THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE REQUIRED STUB UP(S) / OUT(S) AND BOXES WITH MUD-RINGS TO THE NEAREST ACCESSIBLE CEILING SPACE AND / OR NEAREST TECHNOLOGY PATHWAY INFRASTRUCTURE, REFERENCE PLANS AND SPECIFICATION FOR MORE INFORMATION.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONDUCTING A FINAL CLEANUP OF THE WORK SITE PRIOR TO

- THE DESIGNATED SCS / TECHNOLOGY CONTRACTOR(S) SHALL PROVIDE A J-HOOK PATHWAY SYSTEM AND REQUIRED SLEEVES. DO NOT USE CEILING TILE WIRE HANGERS, WATER OR ELECTRICAL PIPES, OR LIGHT FIXTURES TO HANG CABLE. CABLE MUST BE A MINIMUM OF 6 INCHES ABOVE THE CEILING TILE AND MUST NOT COME WITHIN TWELVE INCHES OF A LIGHT FIXTURE.
  - THE SCS / TECHNOLOGY CONTRACTOR WILL PROVIDE THE PATHWAY REQUIRED FOR THE STRUCTURE CABLING SYSTEMS.
  - THE DESIGNATED LOW VOLTAGE / TECHNOLOGY CONTRACTOR(S) FOR EACH "SUB-SYSTEM WILL PROVIDE THE PATHWAY REQUIRED FOR THE SYSTEMS, OUTSIDE WHAT IS CONSIDERED THE STRUCTURED CABLING SYSTEM.
- 29. IN INACCESSIBLE AND HARDLID CEILING SPACES;
  - THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CONDUIT PATHWAYS, BOXES ETC. FOR A COMPLETE SYSTEM FROM THE MDF ROOM, IDF ROOM(S), IDF CABINET(S), AND ALL OTHER LOW VOLTAGE / TECHNOLOGY SYSTEMS HEADEND, CABINETS, TERMINAL CABINETS, ETC. TO THE POINT OF TERMINATION AT THE STATION END LOCATION PER PLANS AND SPECIFICATION.

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**GENERAL NOTES** 

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