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Designers: Mayer/Reed & Jon Bentz Design

SECTION 10 14 00

SIGNS & IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the fabrication and installation of custom signage for King County Metro Transit Facilities.

B. Design Requirements: Provide signage that complies with the Americans With Disabilities Act (ADA) Accessibility Guidelines.

1.2 SUBMITTALS

A. Submittals shall be made in according with the requirements of section (00 00 00 insert Metro section number and title), except as noted herein.

B. Product Data:

1. Submit manufacturer's product specifications, anchor details and installation instructions for products used in sign fabrication, including paint products, lighting and electrical devices.
2. Submit qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects identifying project name, address, designer and owner.
3. Coating Systems: Include finish manufacturer’s technical information such as basic materials analysis and installation instructions. List each material and cross-reference to the specific coating, finish system and application. Identify by manufacturer’s catalog number and general classification.

C. Shop Drawings:

1. Submit complete shop drawings for fabrication and installation of signs and related work including plans, elevations and details of components and attachments to other work. Indicate materials and profiles of each member, fitting, joinery, finishes, fasteners, anchorages and accessory items.
2. For structural elements include details of cuts, connections, camber, holes and other pertinent data. Indicate welds by standard AWS symbols and show size, length and type of each weld.
3. Provide setting drawings, templates and directions for the installation of anchor bolts and other anchorages to be installed in work described in other sections.

D. Typefaces: Submit photocopy of full typographic alphabets for each typeface as indicated on the drawing.

E. Artwork: Submit full size paper proofs for special graphics including arrows, symbols and logos.

F. Materials & Finishes: Submit samples of each sign component material showing finishes, colors and surface textures. Materials & finish samples must be approved before completed product samples are fabricated.

G. Sign Layouts: Submit layout to architectural scale for each sign scheduled. In addition submit full size representative sign layouts for each sign type.

H. Completed Product Samples: Upon approval of all material & finish samples, submit full-size sample units of completed product for the following sign types. Samples shall be retained by the Metro unless noted otherwise.

1. Sign Type A.1: Completed sign assembly. Approved product may be installed.
2. Sign Type C.1: Completed sign assembly. Approved product may be installed.
3. Sign Type J.3: Completed sign assembly. Approved product may be installed.

I. Maintenance Data: Include cleaning recommendations. Provide information on methods and products for field paint repair and graffiti removal.

J. Overstock: Provide overstock of sign components per the following list. Deliver to Metro: (Insert Metro list with quantities).

K. Custom Aluminum Extrusion Dies: Upon completion of project submit extrusion dies to Metro.

L. Custom cast aluminum molds: Upon completion of project submit custom molds to Metro.

1.3 CODES, ORDINANCES AND REGULATIONS

A. The completed installation shall conform to all applicable Federal, State and local codes, ordinances and regulations.

B. Obtain all necessary permits and inspections required by the governing authorities having jurisdiction over this work. Include associated fees in initial proposal.

C. Furnish to the Metro a certificate of approval from the inspection authority at the completion of the work prior to the application for final payment.

D. Where specified materials or methods exceed minimum standards allowed by applicable codes, the more stringent requirement shall apply.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: For each sign form and graphic image process indicated furnish products from manufacturers regularly engaged in work of this magnitude and scope for minimum of five years.

B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with the American Welding Society (AWS) "Standard Qualification Procedure".

C. Uniformity of Manufacturers: For each sign form and graphic image process indicated furnish products of a single manufacturer.

D. Fabrication Observation: Notify Metro 15 days prior to 90 percent completion of the shop fabrication, so that the work may be observed prior to delivery to the job site.

E. Project Manager: Assign project manager and submit their qualifications and experience for approval by Metro.

1.5 PERFORMANCE REQUIREMENTS

A. Expansion & Contraction: Design, fabricate and install component parts to provide for expansion and contraction of the material over a temperature range of 100 degrees F. (83.3 degrees C.), without buckling, sealant joint failure, glass breakage, undue stress on members and anchors, or other detrimental effects.

B. Fabrication Tolerances: Sign panels, cabinets and cladding shall show no visual distortion when viewed in installed position.

C. Panel Alignment at Butt Joints: Sign components shall align parallel and flat without visible variation when viewed from the normal viewing distance.

D. Installation Alignment: Signs will be reviewed by Metro for acceptance. Criteria will include plumbness, trueness, alignments and relationships with adjacent work.

1.6 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to insure proper fitting of work.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver work to project site when adjacent finishes are complete and ready for immediate installation. For product delivered to Metro provide protective wrapping for each piece.

B. Handling Materials and Equipment: Handle finished product in careful manner in order not to damage or mar surfaces of finished product or adjacent finished surfaces.

1.8 METRO PROVIDED ARTWORK

A. Production ready artwork shall be provided as vector (outline) files saved in either EPS or Illustrator format. All fonts (text) shall be converted to curves or outline. Raster file types such as TIFF, bitmap or JPG are not acceptable.

B. Metro shall provide digital artwork and message layouts for all signs.

C. Metro shall furnish and install schedules and maps at transit information display cabinets after product installation and acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Other manufacturer's products of equal or greater quality than those specified in this section may be used. See Section (Insert Metro section number and title) for further information concerning equivalent materials, products, or services.

B. Sign Types B.1, B.2, C.1, C.2: APCO Accord 15 Sign Band. APCO Northwest, 4493 S 134th PL, Seattle, WA 98168, T: 206.835.6830, Sally Young

2.2 METALS

A. Steel: Provide steel in form indicated complying with the following American Society for Testing Materials (ASTM) requirements:

1. Tube: ASTM A 500, Grade B.
2. Shapes and Plates: ASTM A 36.
3. Sheet: ASTM A 240, Type 304.

B. Stainless Steel: Provide austenitic stainless steel in form indicated complying with the following American Society for Testing Materials (ASTM) requirements:

1. Sheet: ASTM A240, Type 304.

C. Aluminum: Provide aluminum in the form indicated complying with the following American Society for Testing Materials (ASTM) requirements:

1. Sheets: ASTM B 209, 5052-H32.
2. Extruded Bar and Shapes: ASTM B221, Alloy 6063-T6.
3. Cast: (TBD)

2.3 MISCELLANEOUS PRODUCTS AND MATERIALS

A. Fasteners: Of same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals which are corrosive or otherwise incompatible with metals joined.

1. Fastening devices between dissimilar materials shall be 300 Series non-magnetic stainless steel bolts.
2. Material: Galvanically compatible with adjacent materials.
3. Finish: Where exposed to view match adjacent material finish.
4. Provide concealed fasteners for interconnection of metal work components and for their attachment to other work except where exposed fasteners are indicated on the drawings.

B. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS specifications, and as required for color match, strength and compatibility in the fabricated items.

C. Glazing: 3/16" clear polycarbonate. Shieffied Makrolon GP, or equal

D. Galvanizing:

1. Provide a zinc coating for steel fabrications, complying with the referenced standards in Article 1.02.
2. Where subject to human contact, remove projections after galvanizing as required for smooth surface. Where zinc coating is reduced below average thickness required by applicable standard referenced above, apply galvanizing repair paint as specified.
3. Preparation for Shop Finishing: After galvanizing, thoroughly clean ornamental metalwork of grease, dirt, oil, flux and other foreign matter, and treat with metallic phosphate process.

E. Custom Aluminum Extrusions:

1. Provide custom aluminum extrusions as indicated on the drawings. Insure compatibility and match-up with other sign components.
2. Provide engineering design for each extrusion for performance, strength and connections.
3. Finish: As indicated on drawings.
4. At completion of project Metro shall retain extrusion dies

F. Anchors and Inserts: Provide anchors of type, size, and material required for type of loading and installation condition shown, as recommended by manufacturer, unless otherwise indicated. Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior locations and elsewhere as required for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

G. Non-Shrink, Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous, gypsum-free grout complying with CE CRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications as indicated on Drawings.

H. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with SSPC-Paint-20.

I. Aluminum Castings:

1. Make castings true to pattern and dimension and free from defects that would affect the service value and exterior appearance.
2. Ensure castings are boldly filleted at angles and the arises are sharp and true.
3. Before castings are removed from foundry, ensure they are cleaned and the parting lines, gates and risers are ground flush.
4. Finish: Rough sand, submit sample.

2.4 GRAPHIC COMPONENTS AND PROCESSES

A. General:

1. All graphics, including text, symbols and arrows shall be executed in such a manner that all edges and corners are true and clean.
2. Type Sizes: As indicated on drawings for particular units.
3. Typefaces: All work to precisely replicate the typefaces as indicated on drawings.
4. Typographic Spacing: Match letter, word and line spacing as indicated on drawings for all text configurations.
5. Symbols and Arrows: Match artwork as indicated on the drawings.

B. Pressure Sensitive Vinyl Graphics:

1. Provide pressure sensitive vinyl messages installed at finished surfaces in the sizes, mounting heights, letter spacing and alignment indicated on drawings.
2. Sign messages shall be provided pre-spaced in type sizes, colors and typeface as shown on the drawings and specified herein. All lettering shall be executed in such a manner that all edges and corners of letter forms are true, clean, photographically precise and accurately reproduce the typeface. Messages shall be smooth and free of air bubbles, open cuts, bulging and foreign matter between message and application surface.
3. Material: 3M high performance vinyl sheeting; or equal, matte finish.
4. Color: As indicated on drawings.

C. Digital Printing:

1. Film: 3M Scotchlite removable reflective graphic film with comply adhesive IJ680CR-10
2. Ink: Option 1 – 3M piezo inkjet series 2700 UV. Ink Option 2 – 3M piezo inkjet series 1500v2.
3. Overlaminate: 3M Scotchcal matte overlaminate 3642GPS.
4. Warranty: 7 years, 3M MCS warranty for vertical exposure.
5. 3M Sales Contact: Cindy Vogel T: 800.947.5722, E: cavogel@mmm.com

2.5 METAL FABRICATION

A. General:

1. Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
2. For exposed work fabricate true to line and level with accurate angles and surfaces and straight sharp edges. Exposed edges shall be square unless otherwise shown. Ease corners and edges where exposed to public touch. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
3. Provide metal work composed of metals of the forms and types which comply with requirements of referenced standards and which are free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, "oil canning", stains, discolorations or other imperfections on finished units will not be accepted.
4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, socket flat-head screws or bolts.
5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
6. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Welded Construction:

1. Select type of weld for best appearance. Use concealed and plug welds wherever possible.
2. Comply with American Welding Standards (AWS) Code for procedures, appearance and quality of welds, and methods used in correcting welding work. Select weld sizes, sequence and equipment to limit distortions to allowable tolerances. Surface "bleed" of back side welding on exposed surfaces will not be accepted.
3. Assemble and weld structural system by methods which will produce true alignment of axes without warp. Grind butt welds flush; dress all exposed welds, feather edges onto base material and polish as required for smooth painted surfaces.
4. Weld corners and seams continuously, complying with AWS recommendations. All exposed welds shall be clean, consistent and uniform in appearance. Grind and finish exposed welds to match adjacent contours and finish. Remove loose rust, mill scale, and spatter, slag or flux deposits.

D. Miscellaneous Trim and Hardware:

1. Provide shapes and sizes as required for profiles shown. Except as otherwise noted, fabricate units from structural steel shapes, plates and bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.
2. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for supporting of signage.
3. Fabricate items to sizes, shapes and dimensions required.

E. Holes for Other Work:

1. Provide holes required for securing other work to structural system, and for the passage of other work through steel members, as shown on the final shop drawings.
2. Provide threaded nuts welded to framing, and other specialty items as shown to receive other work.
3. Drill holes 1/16" oversize for field alignment and fitting.
4. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.

F. Shop Assembly:

1. Fabricate units to configurations indicated on reviewed shop drawings.
2. Provide required text and artwork as indicated on reviewed shop drawings.
3. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

G. Surface Preparation: After inspection and before finishing, clean metal work to be painted. Clean metal by "wheel abrader" process or other method to achieve results defined by Steel Structures Painting Council (SSPC) for "SP-6 Commercial Blast Cleaning".

H. Preparation for Shipping and Handling: Provide strippable protective coating or wrapping.

2.6 METAL FINISHES

A. General:

1. Complete cutting, fitting, forming, drilling and grinding of metal work prior to cleaning, finishing, surface treatment and application of finishes.
2. Comply with National Association of Architectural Metal Manufacturers (NAAMM) "Metal Finishes Manual" for finish designations and application recommendations to match sheet finish specified above, except where more stringent requirements are indicated.
3. Finish all joints, bends, abrasions, and other surface blemishes to match the sheet finish. Finish free of tool or construction marks, or dents.
4. Protect mechanical finishes on exposed surfaces from damage by application of removable temporary protective covering prior to shipment.

B. Stainless Steel:

1. Finish designations prefixed by AISI conform with the system established by the American Iron and Steel Institute for designating finishes for stainless steel sheet.
2. Finish: Vertical or horizontal grain direction as indicated on drawings, AISI No. 4 finish, vertical grain.

C. Anodized Aluminum:

1. Finishing Before Anodizing: Mill finish.
2. Clear Anodized (natural) Finish: AA M21 C22A31, minimum 0.4 mil clear anodized for exterior application.
3. Black Anodized Finish: Minimum 0.4 mil anodized for exterior application.

2.7 COATINGS FOR METAL

A. Acceptable Manufacturers and Products: Matthews Acrylic Polyurethane (MAP), or equal.

B. Recommended System:

1. Aluminum: Matthews Acrylic Polyurethane (MAP), Low VOC or conventional product as required. Primers, catalysts and reducers are to be per manufacturer's recommendations. Match colors and gloss as indicated.
2. Steel: Matthews Acrylic Polyurethane (MAP), Low VOC or conventional product as required. Primers, catalysts and reducers are to be per manufacturers' recommendations. Match colors and gloss as indicated.
3. Clearcoat: Provide protective clearcoat over all painted surfaces. Use Matthews Acrylic Polyurethane (MAP), satin finish.

C. Field Repair: Provide system recommended by manufacturer for field repair by applicators employed by Metro.

D. Application:

1. Substrates to be cleaned and surface prepared as recommended by paint manufacturer.
2. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until previous coat has flashed off as

recommended by coating manufacturer. Sand between coat applications where required to produce an even, smooth surface in accordance with coating manufacturer's directions.

3. Apply additional coats when undercoats or other conditions show through final coat until the cured film is of uniform finish, color and appearance.
4. Minimum Coating Thickness: Dry film thickness and application procedures to be in strict accordance with manufacturer's recommendations. Apply each material at not thinner than manufacturer's recommended spreading rate, as listed above. Provide a total dry film thickness of entire coating system as recommended by manufacturer, unless otherwise indicated.
5. Apply an even film, free of cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections.
6. Completed Work: Match approved samples for color, gloss, texture and coverage. Remove, refinish, or recoat work not in compliance with specified requirements.

E. Color Schedule: Match colors as indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that mounting surfaces to receive signage are properly prepared. Do not start work until conditions are satisfactory.

3.2 PREPARATION

A. Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions and directions for installation of items having integral anchors which are to be installed by others. Coordinate delivery of such items to construction site.

B. Protect mounting surfaces and adjacent areas against damage and discoloration caused by work in this section.

3.3 INSTALLATION

A. General: Locate sign units and accessories where shown or scheduled, using mounting methods of the type described and in compliance with the manufacturers instructions. Install sign units level, plumb and at the height indicated, with sign surfaces free from distortion or other defects in appearance. Notify Metro of installation conflicts.

3.4 PROTECTION

A. Protect finishes from damage during construction period, field handling and installation by use of temporary protective coverings. Protect adjacent surfaces from damage during field fabrication and installation. Remove protective covering at time of substantial completion.

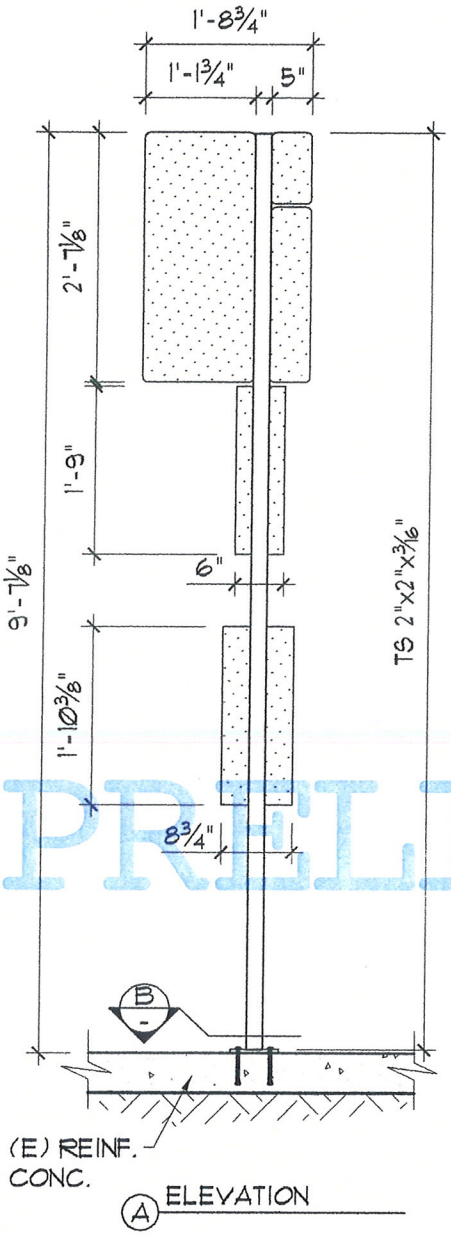
B. Restore finishes damaged during installation and construction period so that no evidence remains of corrective work. Touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface. Touch up damaged surfaces carefully, using airbrush technique where necessary. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units as required.

3.5 CLEANING

A. Clean all exposed surfaces just prior to date of substantial completion in accord with manufacturer's written cleaning instructions. Protect units from damage until acceptance.

PROJECT: KING COUNTY METRO, KING COUNTY, WA
PROJ. NO.: 534-77B.1 DESIGNER: VH
CLIENT: SCOTT ARCHITECTURAL GRAPHICS

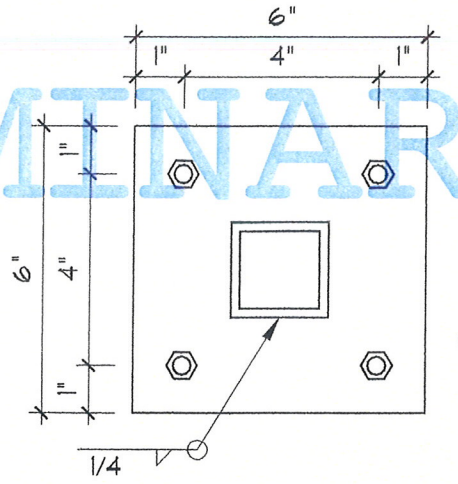
DATE: 04-07-08



(A) ELEVATION

GENERAL NOTES FOR POLES AND FOOTING:

1. CONCRETE f'c=2500 PSI., MIN. SPECIAL INSPECTION NOT REQUIRED.
2. TUBE STEEL ASTM A500 GRADE B.
3. ROLLED STEEL ASTM A36.
4. SIGN CABINETRY SHALL BE FABRICATED IN THE SHOP OF AN APPROVED FABRICATOR.
5. SITE IS NOT SUBJECTED TO WIND SPEED-UP EFFECT ($K_{zt} \leq 1.0$) AS DEFINED IN SECTION 6.5.7.2 OF ASCE 7-05. CONTACT ENGINEER OF RECORD IF SUCH EFFECTS ARE PRESENT.
6. HILTI KB-TZ PER ESR-1917. SPECIAL INSPECTION REQUIRED.
7. SOIL PASSIVE PRESSURE BASED ON 2006 IBC TABLE 1804.2 CLASS 4 OR BETTER. SPECIAL INSPECTION NOT REQUIRED. (IF SOFT OR SANDY SOIL, COLLAPSING OR UNSTABLE SOIL, ORGANIC MATERIALS OR GROUNDWATER ARE ENCOUNTERED, IMMEDIATELY CONTACT THE ENGINEER OF RECORD FOR ADDITIONAL FOUNDATION REQUIREMENTS.)
8. REINFORCING STEEL ASTM A615, GRADE 60.
9. PROVIDE 3" MIN. CLEAR CONCRETE COVER ON ALL STEEL EMBEDDED IN CONCRETE FOOTING.



PL ½"x6"xØ'-6"
W/ (4)-½"ϕ HILTI KB-TZ
2" MIN. EMBEDMENT

(B) BASE PLATE DETAIL

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06-09-08
ALL PAGES

DESIGN CODE- IBC 2006

units; pounds, feet u.n.o.

WIND (wind governs design)

v 2.8

Basic Wind Speed: 85

Exposure C

Design Wind Pressures (psf)

Heights; 15 26.58

Area	Force	Arm	Moment
0.4	11	1.2	12
1.4	36	3.3	118
0.1	3	4.6	16
1.0	27	6.0	158
0.0	0	7.0	1
4.5	119	8.3	987
7.4	**196**		**1292**

Column Design

Tube Steel - ASTM A500 GRADE B

Moment at base (#-ft): 1,292

Required S (in^3): 0.5

S = Moment x 12 / (1.333*24000)

H	M	S req'd.	Size (in)	lbs / ft	t (in)	S
0.0	1,292	0.5	2.0	4.3	0.188	0.7

ASCE 7-05 Wind Loads

6.5.14 F=qh*G*Cf*As * w (w= 1.3 IBC 1605.3) included in calc of F

6.5.10 qh = 0.00256*Kz*Kzt*Kd*V^2*I

Kzt= 1.0 (unless unusual landscape)

Kz= table 6-3

Kd= 0.85 for signs

V= 85

6.5.8 G=0.925 ((1+1.7*gq*Iz*Q)/(1+1.7*gv*Iz)) or 0.85

iz=c*(33/z)^(1/6)

z=max(0.6*h, zmin)

zmin= 15

gv= 3.4

gq= 3.4

Q=sqrt(1.0 / (1+0.63*(B+h)/Lz)^0.63)

Lz= l*(z/33)^e

I= 1 for structural category II

Exposure C

I= 500 (constant for Lz. Table 6.2)

e= 0.2

c= 0.2

sign elem. #	h	Kz	qh	G	s/h	B/s	Cf	pressure	F
1	2.34	0.85	13.36	0.85	0.27	0.67	1.80	26.58	11
2	4.2	0.85	13.36	0.85	0.27	0.67	1.80	26.58	36
3	4.95	0.85	13.36	0.85	0.27	0.67	1.80	26.58	3
4	6.95	0.85	13.36	0.85	0.27	0.67	1.80	26.58	27
5	6.99	0.85	13.36	0.85	0.27	0.7	1.80	26.58	0
6	9.58	0.85	13.36	0.85	0.27	0.7	1.80	26.58	119
								sum:	196

BASE PLATE

INPUT

M	W	EDGE DIST
1292	74	1

Fy	F'c
36000	2500

BOLT TENSION

T = 12*M/.875d= 12*1292/.875*5.00=
3544 LB

PLATE WIDTH, MINIMUM

B=2*(T+W)/.35*1.33*F'c*.375*d=
2*(3544+74)/.35*1.33*2500*.375*5.00=
3.32 IN. PLATE WIDTH USED = 6.00 IN.

ACTING BEARING STRESS

fb=2*(T+W)/B*.375*d=2*(3544+74)/6.00*.375*5.00=
643 PSI

PLATE CANTILEVER

m=(DEPTH-0.95*D)/2=(6.00-0.95*2.00)/2=
2.05 IN

PLATE BENDING DUE TO BOLT TENSION

M=T*(m-EDGE DIST)/B=3544*(2.05-1.00)/6.00=
620 IN LB

PLATE BENDING DUE TO BEARING

M=(T+W)*(m-.125d)/B=(3544+74)*(2.05-.125*5.00)/6.00=
859 IN LB

PLATE THICKNESS

t=(6*M/1.33*F)^.5=(6*859/1.33*27000)^.5=
0.38 IN

BOLTS

A=T/1.33Ft No.=3544/1.33*20000*2=
0.067 SQ IN

WELD

2.00 INCH TUBE
Z=BD+D^2/3=2.00*2.00+2.00^2/3=
5.33 IN^2
fv=12M/Z=12*1292/5.33=
2907 LB/IN

****

Plate 1/2" x 6.00 x 6.00
4 - 1/2" Diam. Hilti KB-TZ, 2" Min. Embed.

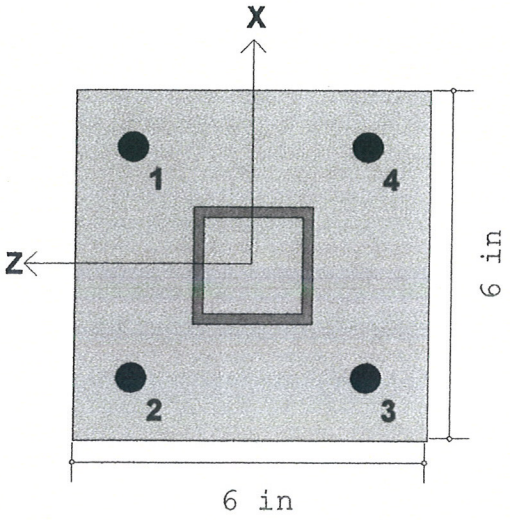
****

****

1/4" FILLET WELD
ALL AROUND

****

King County

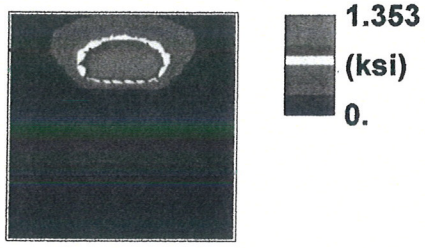


Plain Base Plate Connection

Base Plate Thickness	: .5 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.75 ksi
Anchor Bolt Diameter	: .5 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: TU2X2X3
Design Code	: AISC ASD 9th

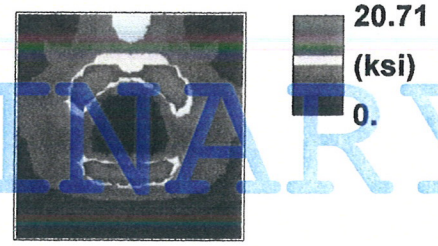
Bearing Pressure

Maximum Bearing 1.353 ksi
Max/Allowable Ratio .58 ASCE EQ.3(E)
(ABIF = 1.333)



Base Plate Stress

Maximum Stress 20.71 ksi
Max/Allowable Ratio .575 ASCE EQ.3(E)
(ASIF = 1.333)



Anchor Bolts

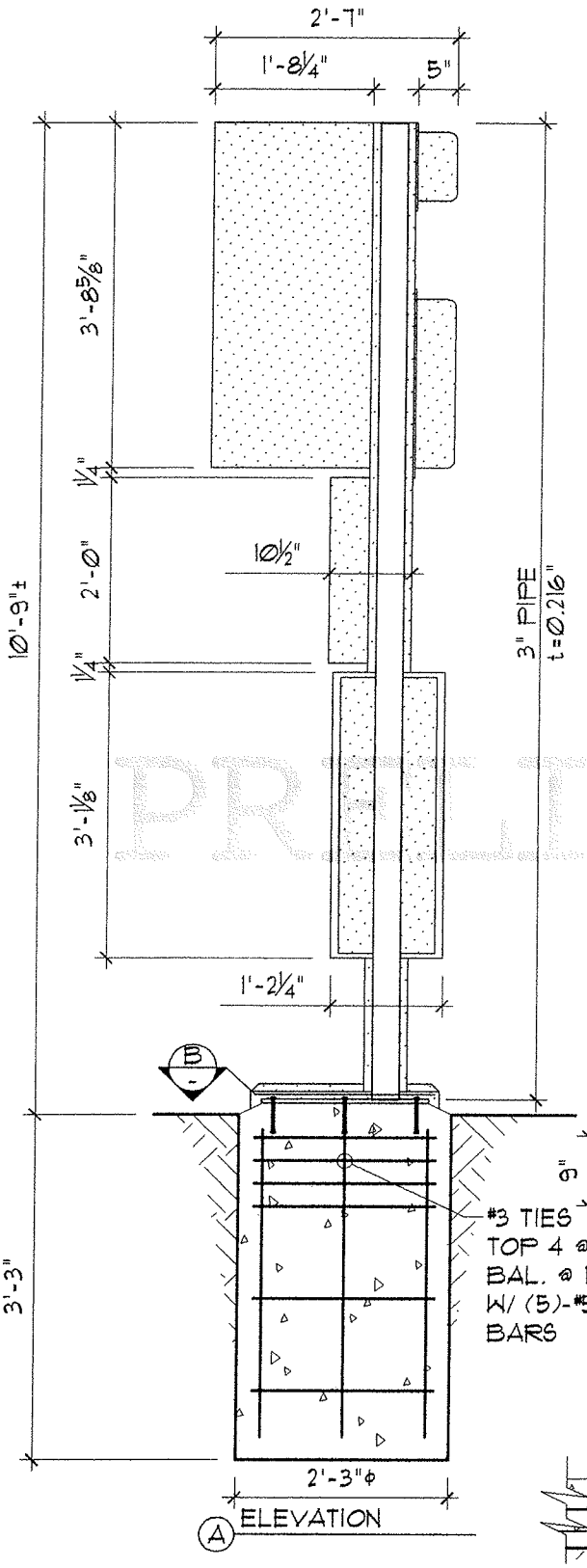
Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Ft (ksi)	Fv (ksi)	Unity	Combination
1	2.	2.	1.769	.049	0.	26.66	13.33	.338	ASCE EQ.3(E)
2	-2.	2.	1.768	-.049	0.	26.66	13.33	.338	ASCE EQ.3(E)
3	-2.	-2.	1.768	-.049	0.	26.66	13.33	.338	ASCE EQ.3(E)
4	2.	-2.	1.768	.049	0.	26.66	13.33	.338	ASCE EQ.3(E)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL	.74					No
WL		.196			1.292	Yes

PROJECT: KING COUNTY METRO, KING COUNTY, WA
PROJ. NO.: 534-TTC DESIGNER: VH
CLIENT: SCOTT ARCHITECTURAL GRAPHICS

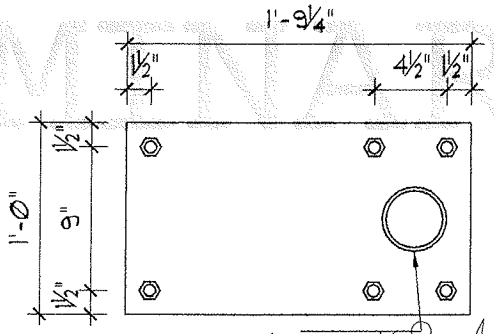
SHEET: 1 OF 5
DATE: 06-06-08



A ELEVATION

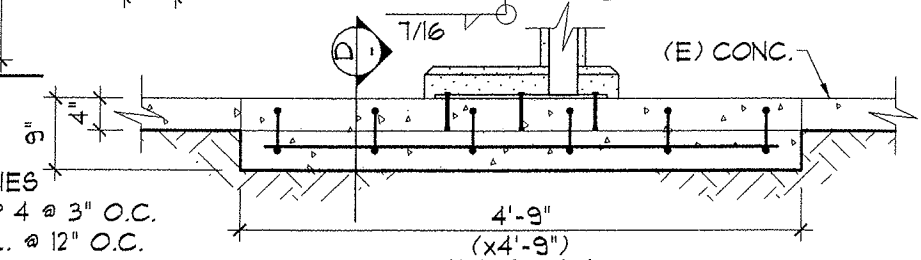
GENERAL NOTES FOR POLES AND FOOTING:

1. CONCRETE f'c=2500 PSI., MIN. SPECIAL INSPECTION NOT REQUIRED.
2. PIPE STEEL ASTM A53 GRADE B.
3. ROLLED STEEL ASTM A36.
4. SIGN CABINETRY SHALL BE FABRICATED IN THE SHOP OF AN APPROVED FABRICATOR.
5. SITE IS NOT SUBJECTED TO WIND SPEED-UP EFFECT ($K_{zt} \leq 1.0$) AS DEFINED IN SECTION 6.5.7.2 OF ASCE 7-05. CONTACT ENGINEER OF RECORD IF SUCH EFFECTS ARE PRESENT.
6. HILTI KB-TZ PER ESR-1917. SPECIAL INSPECTION REQUIRED.
7. SOIL PASSIVE PRESSURE BASED ON 2006 IBC TABLE 1804.2 CLASS 4 OR BETTER. SPECIAL INSPECTION NOT REQUIRED. (IF SOFT OR SANDY SOIL, COLLAPSING OR UNSTABLE SOIL, ORGANIC MATERIALS OR GROUNDWATER ARE ENCOUNTERED, IMMEDIATELY CONTACT THE ENGINEER OF RECORD FOR ADDITIONAL FOUNDATION REQUIREMENTS.)
8. REINFORCING STEEL ASTM A615, GRADE 60.
9. PROVIDE 3" MIN. CLEAR CONCRETE COVER ON ALL STEEL EMBEDDED IN CONCRETE FOOTING.
10. IF THE ANCHOR BOLT OPTION IS USED THE GENERAL CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS ARE IN GOOD CONDITION AT THE LOCATION (AND SURROUNDING AREA) OF THE ANCHOR.

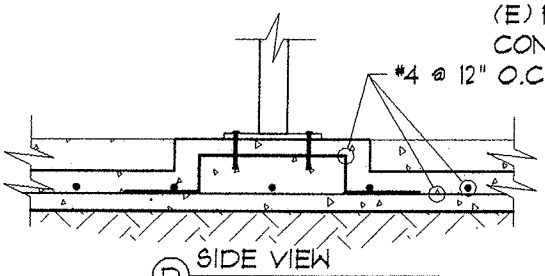


PL ⅞"x21½"x1'-0"
W/ (6)-½"ϕ HILTI KB-TZ
STAINLESS STEEL
2" MIN. EMBEDMENT

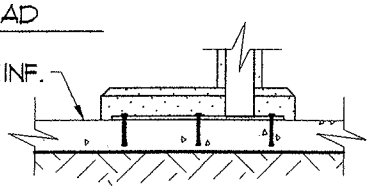
B BASE PLATE DETAIL



C ALT. SPREAD FOOTING



D SIDE VIEW



E ALT. FOOTING ATTACHMENT

PROJECT: KING COUNTY METRO, KING COUNTY, WA
PROJ. NO.: 534-TTC DESIGNER: VH
CLIENT: SCOTT ARCHITECTURAL GRAPHICS

SHEET: 2 OF 5
DATE: 06-06-08

DESIGN CODE- IBC 2006

units; pounds, feet u.n.o.

WIND (wind governs design)

v2.8 Basic Wind Speed: 85

Exposure C

Design Wind Pressures (psf)

Heights; 15 25.84

Area	Force	Arm	Moment
0.3	9	0.1	1
0.8	20	1.0	20
3.7	95	3.2	308
0.1	1	4.8	7
1.8	45	5.9	267
9.6	248	8.8	2171
16.2	**418**		**2774**

Footing Design

(IBC Table 1804.2 & note d, & Sec. 1804.3.1)

Footing Type: round

Soil Pressure(150x2x1.33): 400 b= 2.25

S1 = S x d / 3 S1= 433

A = 2.34 x P / (S1 x b) A= 1.01

d =0.5xA (1+ (1+4.36x h/A) ^.5)= 3.25

Formula Per IBC Section 1805.7.2.1

Footing size: 2'-3'' DIA. x 3'-3'' Depth

Column Design

Pipe Steel - ASTM A53 Grade B

Moment at base (#-ft): 2,774

Required S (in^3): 1.1

S = Moment x 12 / (1.333*22000)

H	M	S req'd.	Size (in)	lbs / ft	t (in)	S
0.0	2,774	1.1	3.0	7.6	0.216	1.7

Check Anchor

Moment = 2774'#

Tension = 2774'#x12"/9" = 3699#

USE HILTI KB-TZ -- 1/2" Diam. S.S., 2" min. embed.

Tall = 1476# x 1.33 = 1963#

T/2 = 1850# OK

Check Plate

Moment = 2774#x3" = 8322'#

b = 3.0

t = 0.875

S = 0.17x3.0x0.875^2 = 0.393

fs = 8322'#/0.393 = 21,176

Fall = 36000x0.6x1.33 = 28,728

PROJECT: KING COUNTY METRO, KING COUNTY, WA
PROJ. NO.: 534-TTC DESIGNER: VH
CLIENT: SCOTT ARCHITECTURAL GRAPHICS

DATE: 06-06-08

ASCE 7-05 Wind Loads

6.5.14 F=qh*G*Cf*As * w (w= 1.3 IBC 1605.3) included in calc of F

6.5.10 qh = 0.00256*Kz*Kzt*Kd*V^2*I

Kzt= 1.0 (unless unusual landscape)
Kz= table 6-3
Kd= 0.85 for signs
V= 85

I= 1 for structural category II
Exposure C
I= 500 (constant for Lz. Table 6.2)
e= 0.2
c= 0.2

6.5.8 G=0.925 ((1+1.7*gq*Iz*Q)/(1+1.7*gv*Iz)) or 0.85
iz=c*(33/z)^(1/6)
z=max(0.6*h, zmin)
zmin= 15
gv= 3.4
gq= 3.4
Q=sqrt(1.0 / (1+0.63*(B+h)/Lz)^0.63)
Lz= l*(z/33)^e

sign elem. #	h	Kz	qh	G	s/h	B/s	Cf	pressure	F
1	0.25	0.85	13.36	0.85	0.35	0.69	1.75	25.84	9
2	1.7	0.85	13.36	0.85	0.35	0.69	1.75	25.84	20
3	4.794	0.85	13.36	0.85	0.35	0.69	1.75	25.84	95
4	4.898	0.85	13.36	0.85	0.35	0.69	1.75	25.84	1
5	6.898	0.85	13.36	0.85	0.35	0.7	1.75	25.84	45
6	10.617	0.85	13.36	0.85	0.35	0.7	1.75	25.84	248
								sum:	418

General Footing Analysis & Design

Description Spread Footing

General Information

Code Ref: ACI 318-02, 1997 UBC, 2003 IBC, 2003 NFPA 5000

Allowable Soil Bearing	2,000.0 psf	**Dimensions...**	
Short Term Increase	1.330	Width along X-X Axis	4.750 ft
Seismic Zone	4	Length along Y-Y Axis	4.750 ft
		Footing Thickness	5.00 in
Live & Short Term Combined		Col Dim. Along X-X Axis	57.00 in
f'c	2,500.0 psi	Col Dim. Along Y-Y Axis	24.00 in
Fy	60,000.0 psi	Base Pedestal Height	4.000 in
Concrete Weight	145.00 pcf		
Overburden Weight	0.00 psf	Min Steel %	0.0009
		Rebar Center To Edge Distance	3.50 in

Loads

Applied Vertical Load...

Dead Load	0.162 k	...ecc along X-X Axis	0.000 in
Live Load	k	...ecc along Y-Y Axis	0.000 in
Short Term Load	k		

Applied Moments...	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Dead Load	k-ft	k-ft
Live Load	k-ft	k-ft
Short Term	k-ft	2.770 k-ft

Applied Shears...	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Dead Load	k	k
Live Load	k	k
Short Term	k	0.420 k

Summary

4.75ft x 4.75ft Footing, 5.0in Thick, w/ Column Support 57.00 x 24.00in x 4.0in high

	DL+LL	DL+LL+ST
Max Soil Pressure	87.9	339.5 psf
Allowable	2,000.0	2,660.0 psf
"X' Ecc, of Resultant	0.000 in	0.000 in
"Y' Ecc, of Resultant	0.000 in	18.656 in
X-X Min. Stability Ratio	1.528	1.500 :1
Y-Y Min. Stability Ratio	No Overturning	

	Actual	Allowable
Max Mu	0.207 k-ft per ft	
Required Steel Area		0.054 in2 per ft
Shear Stresses....	Vu	Vn * Phi
1-Way	13.432	85.000 psi
2-Way	1.892	100.179 psi

Footing Design

Shear Forces	ACI C-1	ACI C-2	ACI C-3	Vn * Phi
Two-Way Shear	1.89 psi	0.59 psi	0.38 psi	100.18 psi
One-Way Shears...				
Vu @ Left	0.00 psi	0.00 psi	0.00 psi	85.00 psi
Vu @ Right	0.00 psi	0.00 psi	0.00 psi	85.00 psi
Vu @ Top	2.64 psi	13.43 psi	8.63 psi	85.00 psi
Vu @ Bottom	2.64 psi	-5.87 psi	-3.78 psi	85.00 psi

Moments	ACI C-1	ACI C-2	ACI C-3	Ru / Phi	As Req'd	
Mu @ Left	0.00 k-ft	0.00 k-ft	0.00 k-ft	0.0 psi	0.00 in2	per ft
Mu @ Right	0.00 k-ft	0.00 k-ft	0.00 k-ft	0.0 psi	0.00 in2	per ft
Mu @ Top	0.04 k-ft	0.21 k-ft	0.13 k-ft	102.4 psi	0.05 in2	per ft
Mu @ Bottom	0.04 k-ft	-0.08 k-ft	-0.05 k-ft	39.5 psi	-0.05 in2	per ft

Description Spread Footing

Soil Pressure Summary

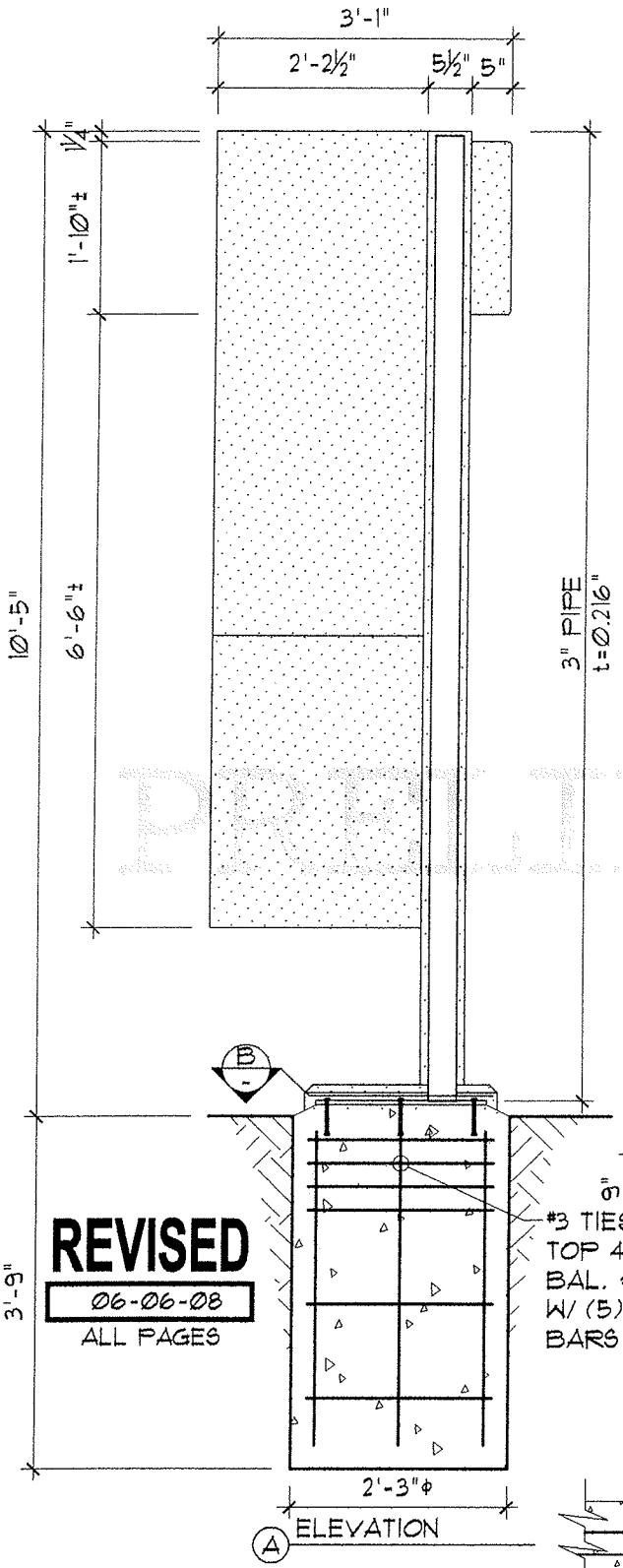
Service Load Soil Pressures	Left	Right	Top	Bottom
DL + LL	87.95	87.95	87.95	87.95 psf
DL + LL + ST	87.95	87.95	339.51	0.00 psf
Factored Load Soil Pressures				
ACI Eq. C-1	123.13	123.13	123.13	123.13 psf
ACI Eq. C-2	94.64	94.64	365.32	0.00 psf
ACI Eq. C-3	60.84	60.84	234.85	0.00 psf

ACI Factors (per ACI 318-02, applied internally to entered loads)

ACI C-1 & C-2 DL	1.400	ACI C-2 Group Factor	0.750	Add'l "1.4" Factor for Seismic	1.400
ACI C-1 & C-2 LL	1.700	ACI C-3 Dead Load Factor	0.900	Add'l "0.9" Factor for Seismic	0.900
ACI C-1 & C-2 ST	1.700	ACI C-3 Short Term Factor	1.300		
....seismic = ST * :	1.100 Used in ACI C-2 & C-3				

PROJECT: KING COUNTY METRO, KING COUNTY, WA
PROJ. NO.: 534-77A.1 DESIGNER: VH
CLIENT: SCOTT ARCHITECTURAL GRAPHICS

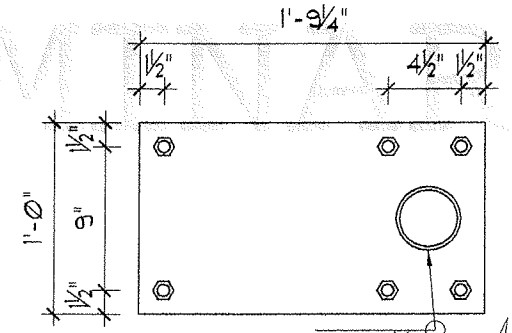
SHEET: 1 OF 5
DATE: 04-07-08



A ELEVATION

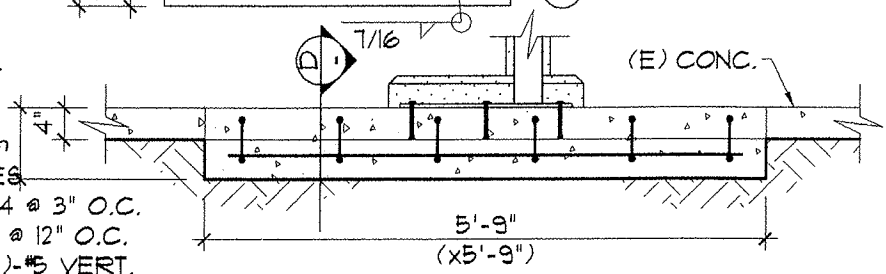
GENERAL NOTES FOR POLES AND FOOTING:

1. CONCRETE f'c=2500 PSI., MIN. SPECIAL INSPECTION NOT REQUIRED.
2. PIPE STEEL ASTM A53 GRADE B.
3. ROLLED STEEL ASTM A36.
4. SIGN CABINETRY SHALL BE FABRICATED IN THE SHOP OF AN APPROVED FABRICATOR.
5. SITE IS NOT SUBJECTED TO WIND SPEED-UP EFFECT ($K_{zt} \leq 1.0$) AS DEFINED IN SECTION 6.5.7.2 OF ASCE 7-05. CONTACT ENGINEER OF RECORD IF SUCH EFFECTS ARE PRESENT.
6. HILTI KB-TZ PER ESR-1917. SPECIAL INSPECTION REQUIRED.
7. SOIL PASSIVE PRESSURE BASED ON 2006 IBC TABLE 1804.2 CLASS 4 OR BETTER. SPECIAL INSPECTION NOT REQUIRED. (IF SOFT OR SANDY SOIL, COLLAPSING OR UNSTABLE SOIL, ORGANIC MATERIALS OR GROUNDWATER ARE ENCOUNTERED, IMMEDIATELY CONTACT THE ENGINEER OF RECORD FOR ADDITIONAL FOUNDATION REQUIREMENTS.)
8. REINFORCING STEEL ASTM A615, GRADE 60.
9. PROVIDE 3" MIN. CLEAR CONCRETE COVER ON ALL STEEL EMBEDDED IN CONCRETE FOOTING.
10. IF THE ANCHOR BOLT OPTION IS USED THE GENERAL CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS ARE IN GOOD CONDITION AT THE LOCATION (AND SURROUNDING AREA) OF THE ANCHOR.

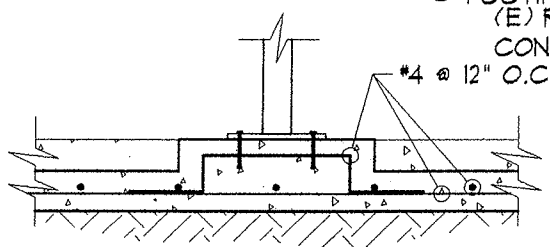


PL ¾"x2½"x1'-0"
W/ (6)-½"ϕ HILTI KB-TZ
STAINLESS STEEL
3¼" MIN. EMBEDMENT

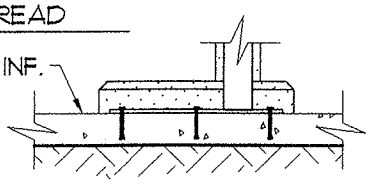
B BASE PLATE DETAIL



C ALT. SPREAD FOOTING



D SIDE VIEW



E ALT. FOOTING ATTACHMENT

REVISED
06-06-08
ALL PAGES

DESIGN CODE- IBC 2006

units; pounds, feet u.n.o.

WIND (wind governs design)

v 2.8

Basic Wind Speed: 85

Exposure C

Design Wind Pressures (psf)

Heights; 15 25.10

Area	Force	Arm	Moment
0.4	10	0.1	1
0.8	20	1.1	23
17.6	442	5.3	2339
5.7	143	9.5	1358
24.5	**615**		**3721**

Footing Design

(IBC Table 1804.2 & note d, & Sec. 1804.3.1)

Footing Type: round

Soil Pressure(150x2x1.33): 400 b= 2.25

S1 = S x d / 3 S1= 489

A = 2.34 x P / (S1 x b) A= 1.31

d =0.5xA (1+ (1+4.36x h/A) ^.5)= 3.66

Formula Per IBC Section 1805.7.2.1

Footing size: 2'-3'' DIA. x 3'-9'' Depth

Column Design

Pipe Steel - ASTM A53 Grade B

Moment at base (#-ft): 3,721

Required S (in^3): 1.5

S = Moment x 12 / (1.333*22000)

H	M	S req'd.	Size (in)	lbs / ft	t (in)	S
0.0	3,721	1.5	3.0	7.6	0.216	1.7

Check Anchor

Moment = 3721'#

Tension = 3721'#x12"/9" = 4961#

USE HILTI KB-TZ -- 1/2" Diam. S.S., 3-1/4" min. embed.

Tall = 2312# x 1.33 = 3075#

T/2 = 2481# OK

Check Plate

Moment = 2481#x3" = 7443'#

b = 3.0

t = 0.75

S = 0.17x3.0x0.75^2 = 0.287

fs = 7443'#/0.287 = 25,934

Fall = 36000x0.6x1.33 = 28,728

ASCE 7-05 Wind Loads

6.5.14 F=qh*G*Cf*As * w (w= 1.3 IBC 1605.3) included in calc of F

6.5.10 qh = 0.00256*Kz*Kzt*Kd*V^2*I

Kzt= 1.0 (unless unusual landscape)
Kz= table 6-3
Kd= 0.85 for signs
V= 85

I= 1 for structural category II
Exposure C
I= 500 (constant for Lz. Table 6.2)
e= 0.2
c= 0.2

6.5.8 G=0.925 ((1+1.7*gq*Iz*Q)/(1+1.7*gv*Iz)) or 0.85
iz=c*(33/z)^(1/6)
z=max(0.6*h, zmin)

zmin= 15
gv= 3.4
gq= 3.4

Q=sqrt(1.0 / (1+0.63*(B+h)/Lz)^0.63)
Lz= l*(z/33)^e

sign

elem. #	h	Kz	qh	G	s/h	B/s	Cf	pressure	F
1	0.25	0.85	13.36	0.85	0.63	0.41	1.70	25.10	10
2	2	0.85	13.36	0.85	0.63	0.41	1.70	25.10	20
3	8.59	0.85	13.36	0.85	0.63	0.41	1.70	25.10	442
4	10.42	0.85	13.36	0.85	0.63	0.41	1.70	25.10	143
								sum:	615

Rev: 580002
User: KW-0600544, Ver 5.8.0, 1-Dec-2003
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General Footing Analysis & Design

Description Spread Footing

General Information

Code Ref: ACI 318-02, 1997 UBC, 2003 IBC, 2003 NFPA 5000

Allowable Soil Bearing	2,000.0 psf	**Dimensions...**	
Short Term Increase	1.330	Width along X-X Axis	5.750 ft
Seismic Zone	4	Length along Y-Y Axis	5.750 ft
		Footing Thickness	5.00 in
Live & Short Term Combined		Col Dim. Along X-X Axis	69.00 in
f'c	2,500.0 psi	Col Dim. Along Y-Y Axis	24.00 in
Fy	60,000.0 psi	Base Pedestal Height	4.000 in
Concrete Weight	145.00 pcf	Min Steel %	0.0009
Overburden Weight	0.00 psf	Rebar Center To Edge Distance	3.50 in

Loads

Applied Vertical Load...

Dead Load	0.245 k	...ecc along X-X Axis	0.000 in
Live Load	k	...ecc along Y-Y Axis	0.000 in
Short Term Load	k		

Applied Moments...	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Dead Load	k-ft	k-ft
Live Load	k-ft	k-ft
Short Term	k-ft	3.720 k-ft

Applied Shears...	Creates Rotation about Y-Y Axis (pressures @ left & right)	Creates Rotation about X-X Axis (pressures @ top & bot)
Dead Load	k	k
Live Load	k	k
Short Term	k	0.620 k

Summary

5.75ft x 5.75ft Footing, 5.0in Thick, w/ Column Support 69.00 x 24.00in x 4.0in high

	DL+LL	DL+LL+ST
Max Soil Pressure	84.6	235.2 psf
Allowable	2,000.0	2,660.0 psf
'X' Ecc, of Resultant	0.000 in	0.000 in
'Y' Ecc, of Resultant	0.000 in	17.946 in
X-X Min. Stability Ratio	1.922	1.500 :1
Y-Y Min. Stability Ratio	No Overturning	

	Actual	Allowable
Max Mu	0.251 k-ft per ft	
Required Steel Area		0.054 in2 per ft
Shear Stresses....	Vu	Vn * Phi
1-Way	12.562	85.000 psi
2-Way	2.500	98.281 psi

Footing Design

Shear Forces	ACI C-1	ACI C-2	ACI C-3	Vn * Phi
Two-Way Shear	2.50 psi	0.84 psi	0.54 psi	98.28 psi
One-Way Shears...				
Vu @ Left	0.00 psi	0.00 psi	0.00 psi	85.00 psi
Vu @ Right	0.00 psi	0.00 psi	0.00 psi	85.00 psi
Vu @ Top	3.49 psi	12.56 psi	8.08 psi	85.00 psi
Vu @ Bottom	3.49 psi	-8.19 psi	-5.26 psi	85.00 psi

Moments	ACI C-1	ACI C-2	ACI C-3	Ru / Phi	As Req'd	
Mu @ Left	0.00 k-ft	0.00 k-ft	0.00 k-ft	0.0 psi	0.00 in2	per ft
Mu @ Right	0.00 k-ft	0.00 k-ft	0.00 k-ft	0.0 psi	0.00 in2	per ft
Mu @ Top	0.06 k-ft	0.25 k-ft	0.16 k-ft	123.9 psi	0.05 in2	per ft
Mu @ Bottom	0.06 k-ft	-0.15 k-ft	-0.10 k-ft	73.3 psi	-0.05 in2	per ft

Description Spread Footing

Soil Pressure Summary

Service Load Soil Pressures	Left	Right	Top	Bottom
DL + LL	84.64	84.64	84.64	84.64 psf
DL + LL + ST	84.64	84.64	235.20	0.00 psf
Factored Load Soil Pressures				
ACI Eq. C-1	118.49	118.49	118.49	118.49 psf
ACI Eq. C-2	94.96	94.96	263.87	0.00 psf
ACI Eq. C-3	61.04	61.04	169.63	0.00 psf

ACI Factors (per ACI 318-02, applied internally to entered loads)

ACI C-1 & C-2 DL	1.400	ACI C-2 Group Factor	0.750	Add"l "1.4" Factor for Seismic	1.400
ACI C-1 & C-2 LL	1.700	ACI C-3 Dead Load Factor	0.900	Add"l "0.9" Factor for Seismic	0.900
ACI C-1 & C-2 ST	1.700	ACI C-3 Short Term Factor	1.300		
....seismic = ST * :	1.100 Used in ACI C-2 & C-3				