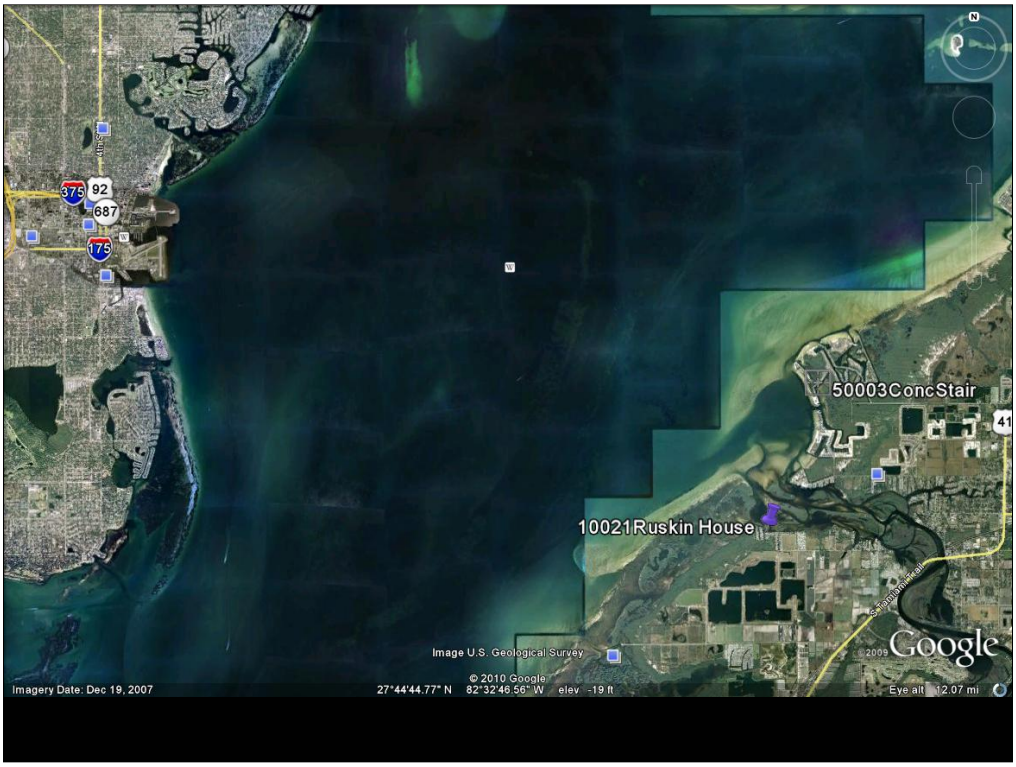
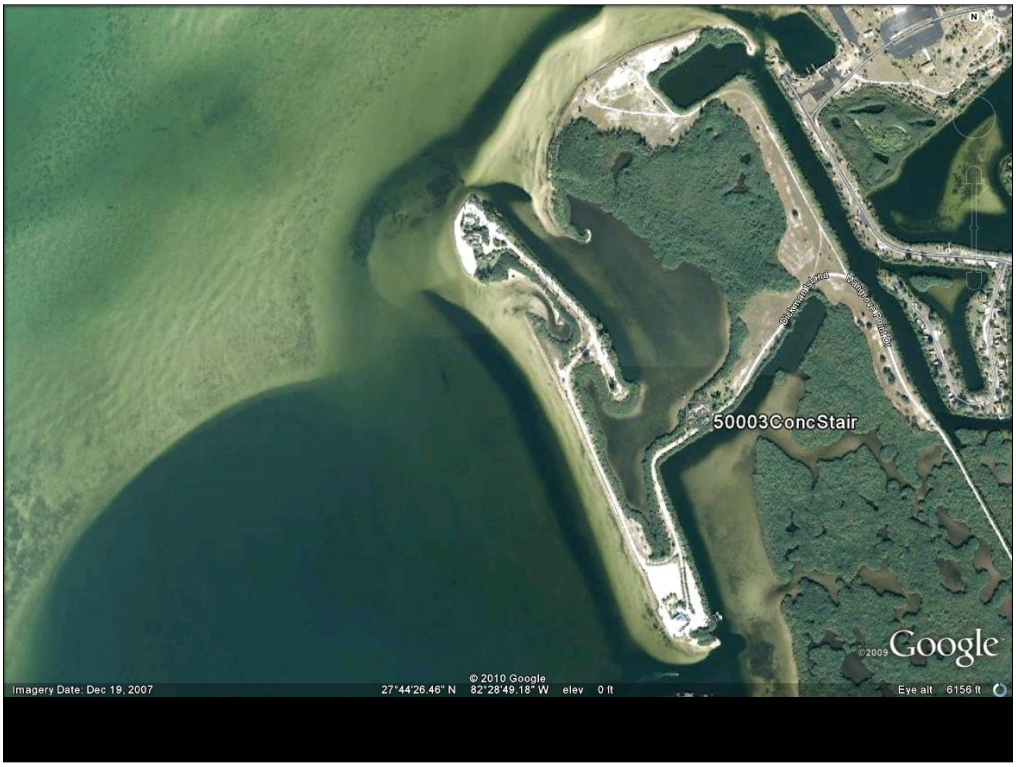
Edward allen Chapters: Concrete Construction, *entire chapter,* Steel Frame Construction, *History, The material Steel.*

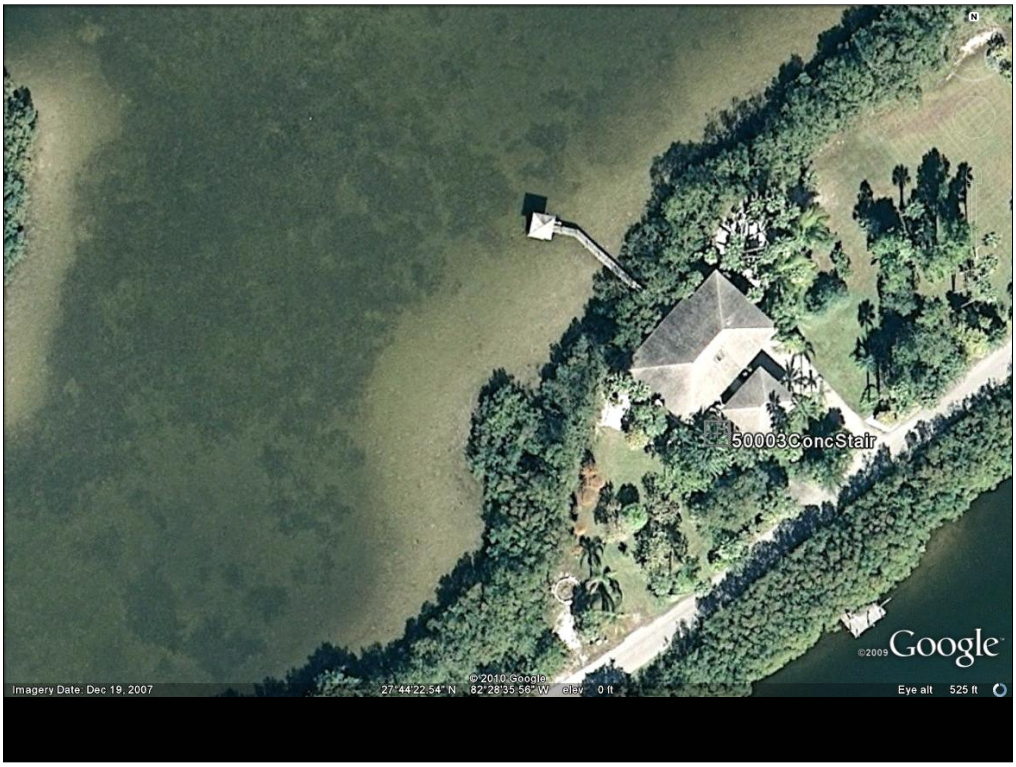
Additional Resources: http://www.euclidchemical.com/, http://www.stewartstainless.com/



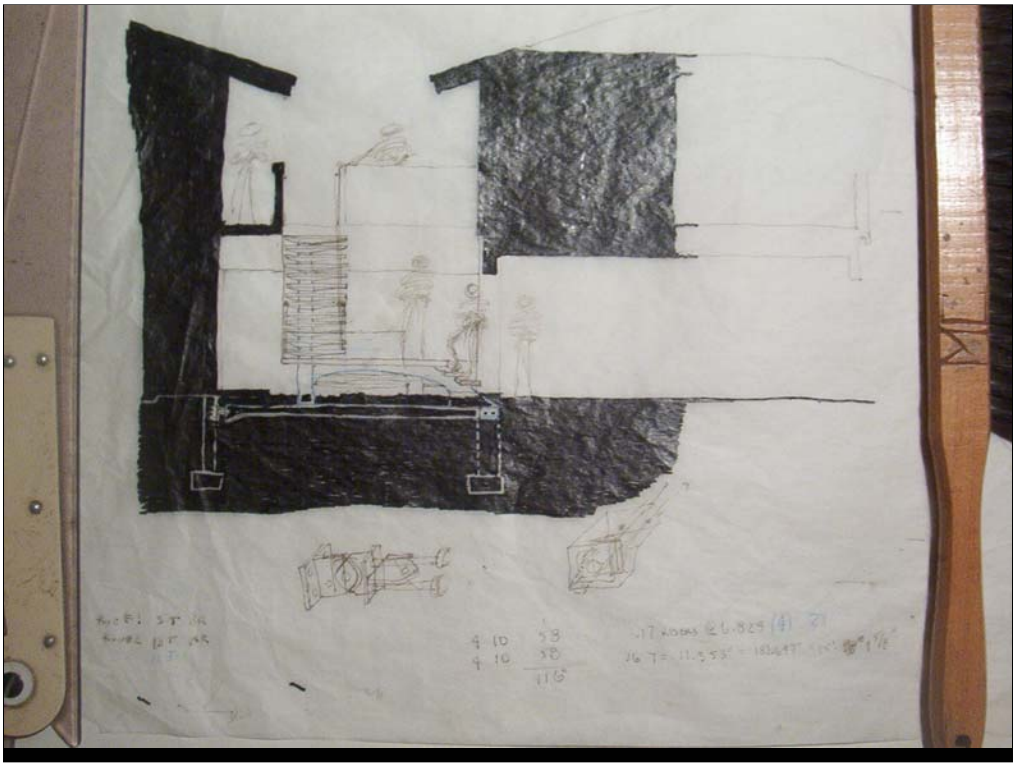
Site conditions, salt water conditions, Tampa Bay to the west, tip of St. Pete to west, Skyway Bridge is at SW



Locally, there is some protection via a strip of land to the west . . . Very little during storms.

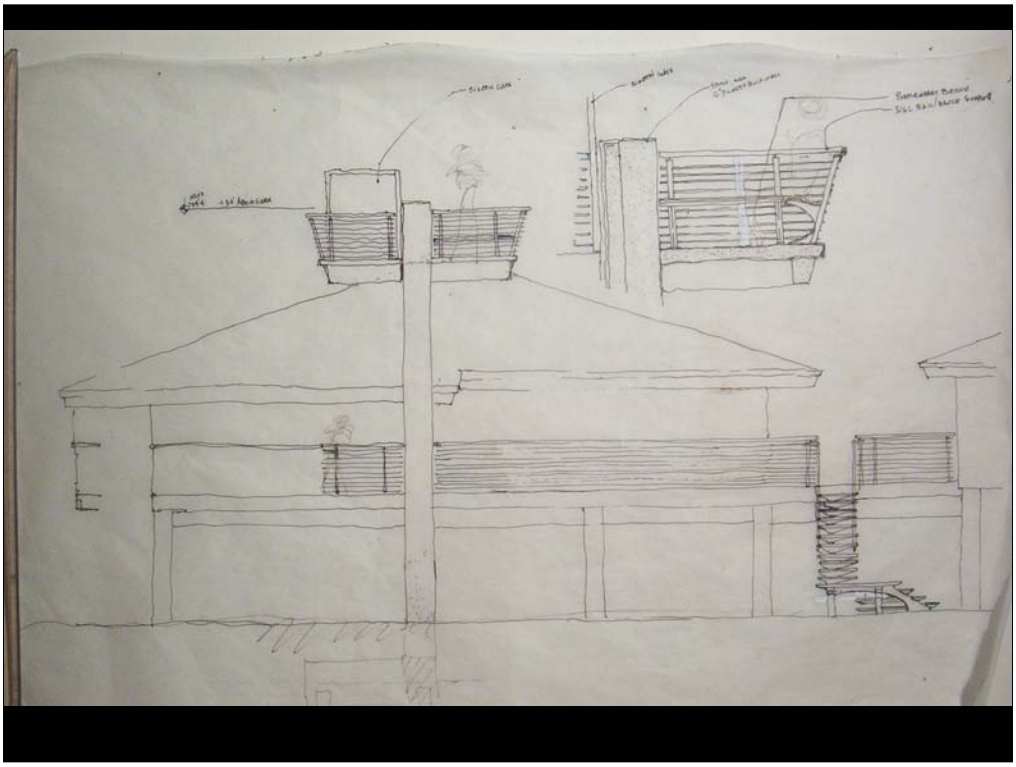


More locally, the stair is between the two structures, the smaller structure serves as an office and guest quarters.

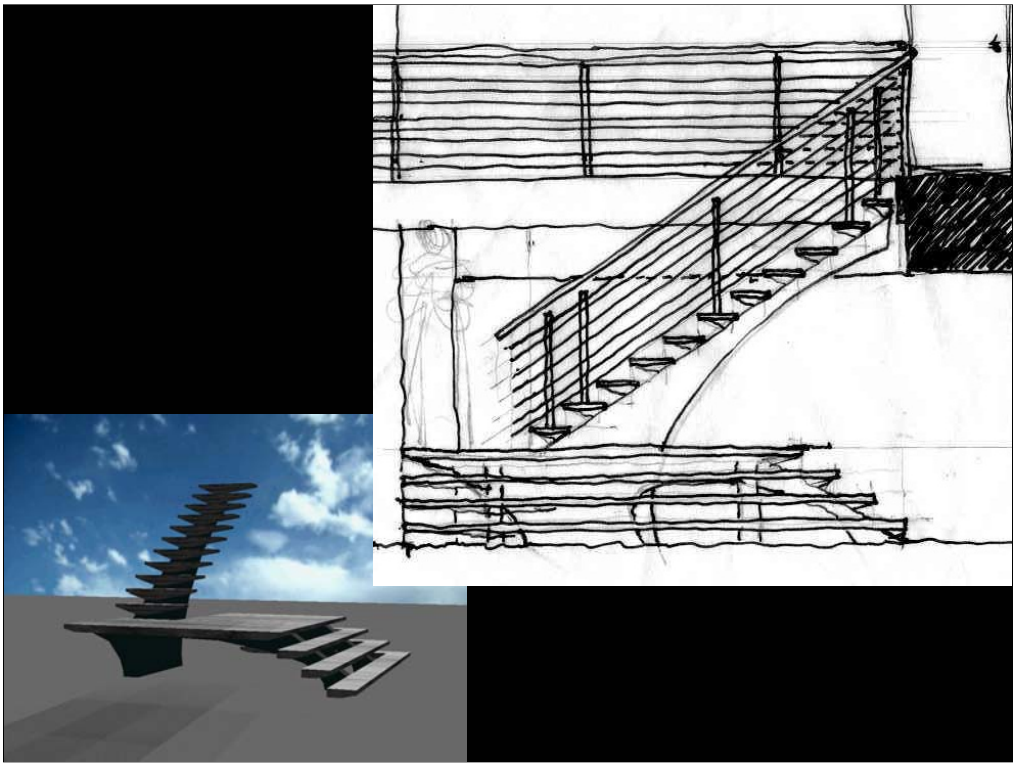


Concept: durability, anchor to pile/grade beam foundation system to ensure protection against hurricane conditions and erosion possibilities defined by FEMA flood maps: V13 – High velocity hurricane zone. Ref: FEMA publication 15 http://www.fema.gov/library/viewRecord.do?id=1628

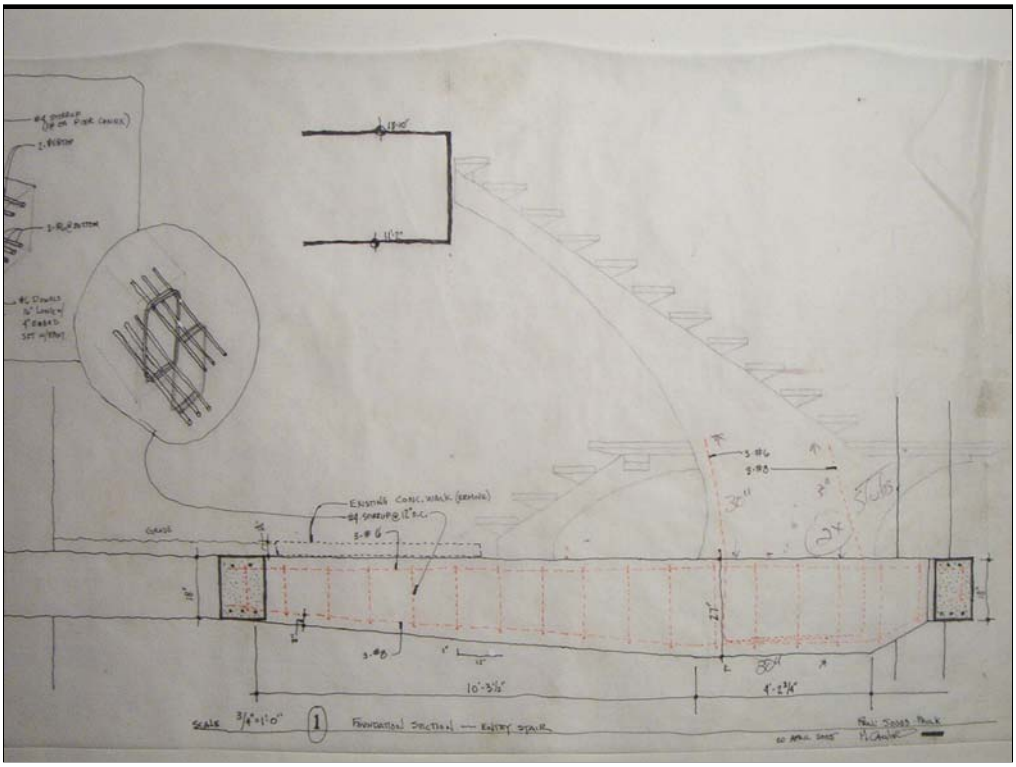
US army corps of engineers, Coastal Engineering Manual (in 5 parts): info about designing breakwaters and foundation systems to resist flood waters, tidal currents, etc. http://140.194.76.129/publications/eng-manuals/ > EM 1110-2-1100 PARTS I – V.



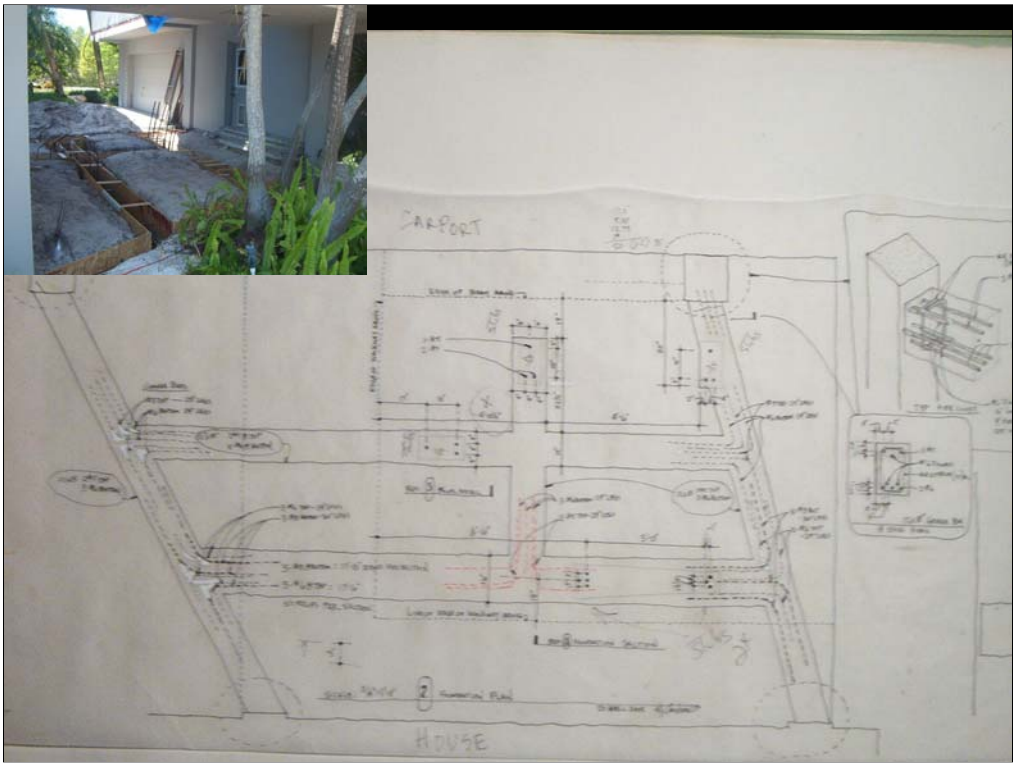
Initial talks included a ‘widow’s walk’ element that could be accessed via a small lift, just for 2 or 4 people to hang out and have a drink overlooking the western view to the water over the mangroves.



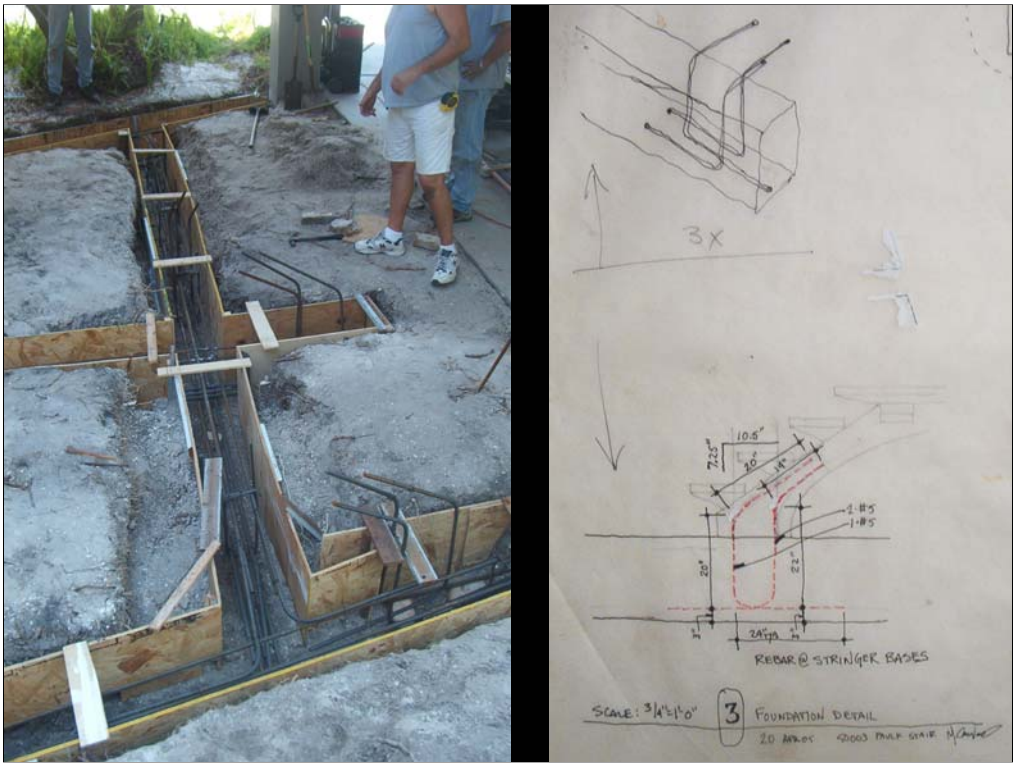
Concept, the stair grows from the ground level and reaches up to the protected level above without touching. Practically, in a hurricane/storm event, the stair will withstand the wave forces, erosion, etc on its own without imparting any forces on the structure above, avoiding any damage.



Foundation becomes critical element to allow the cantilever stringer to self-support and not impart forces to the structure above. As much structure below grade as above grade

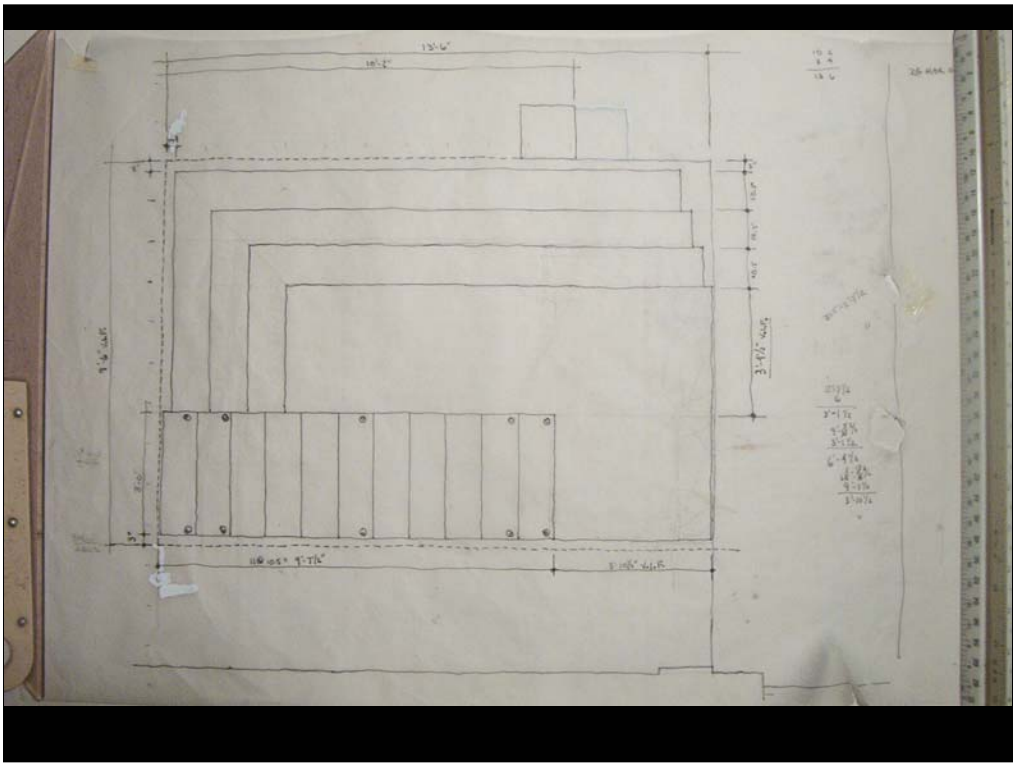


Foundation plan. Showing transitions between rebar at corners specifying to Robert and his crew how the overlaps must be done.

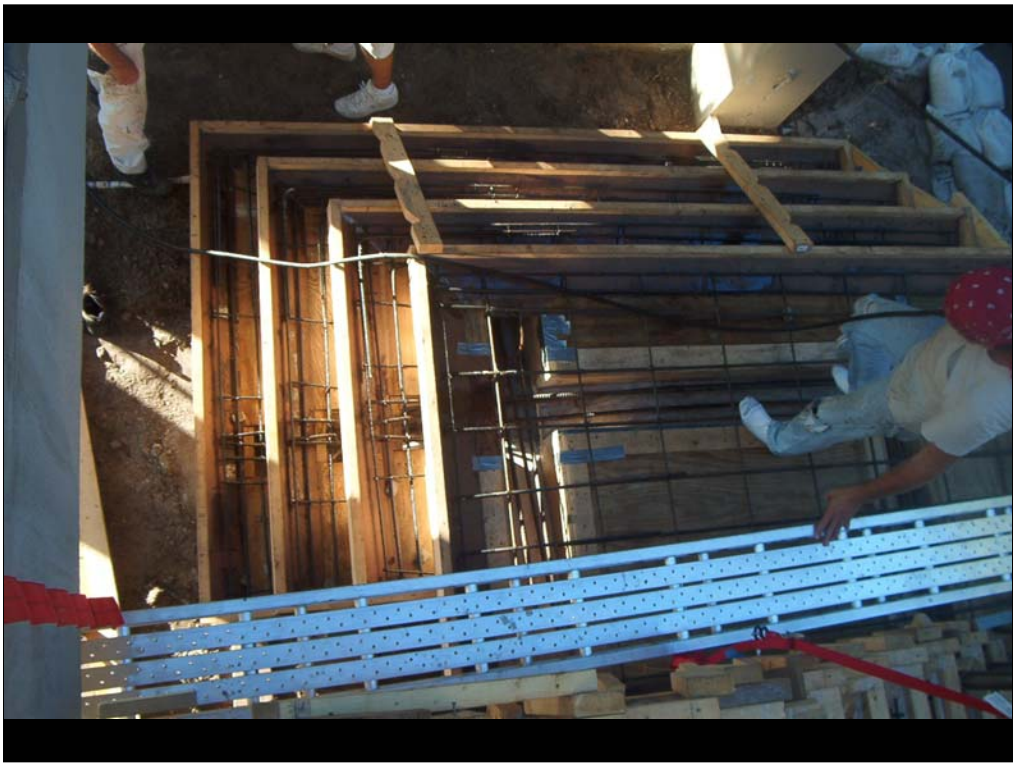


Vertical bar integration and overlaps in the structure to be accurately placed for forms above.

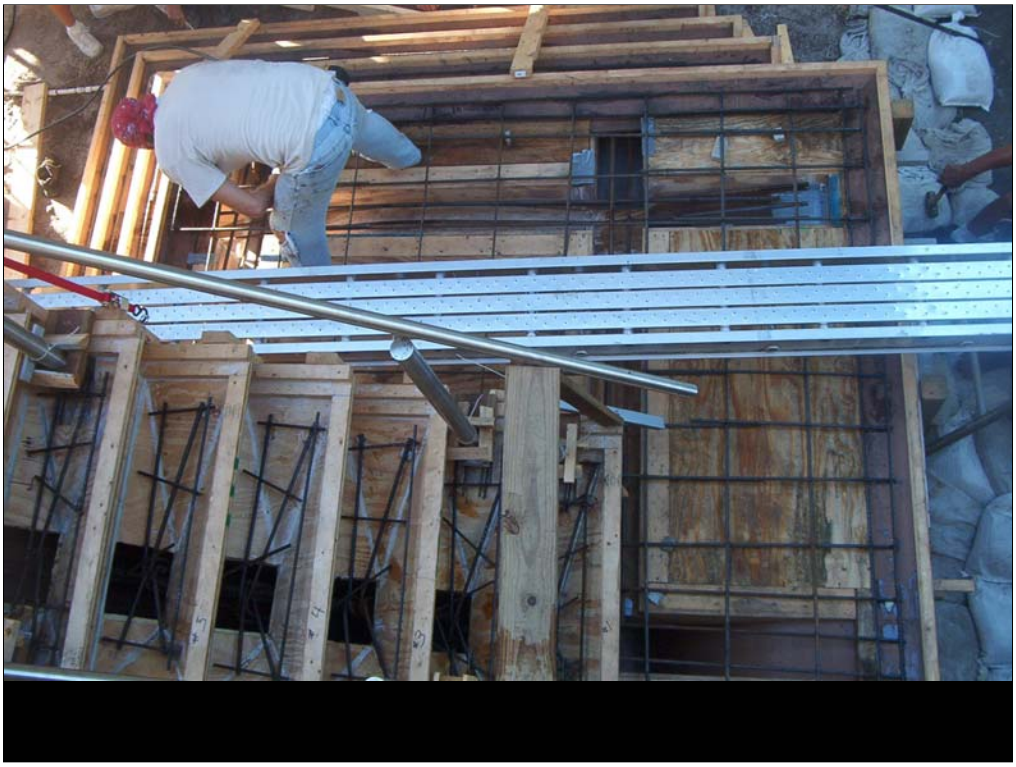
Main stringer rebar at far right and above in background. The smaller rib structure rebar is in foreground. Technology is very simple but in this case is dependent on accurate measurements and placement. – Frequent site visits . . . On call to lay out critical parts.



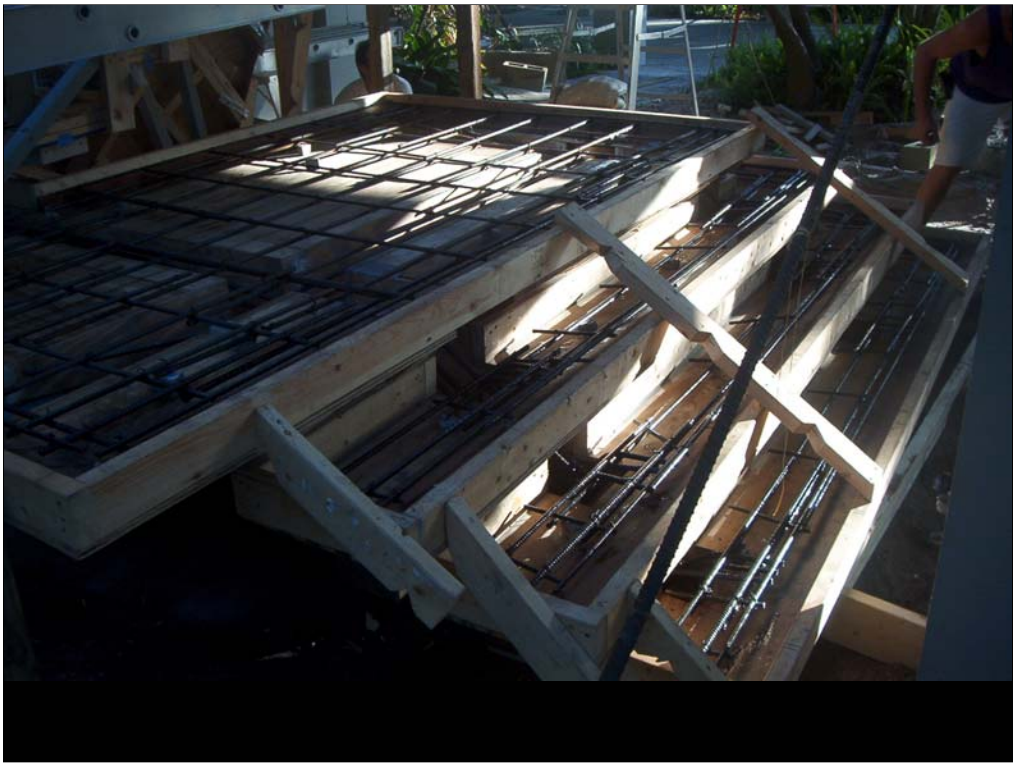
Plan defining tread and landing dimensions based on code requirements. www.floridabuilding.org. > Egress chapter > stair design.



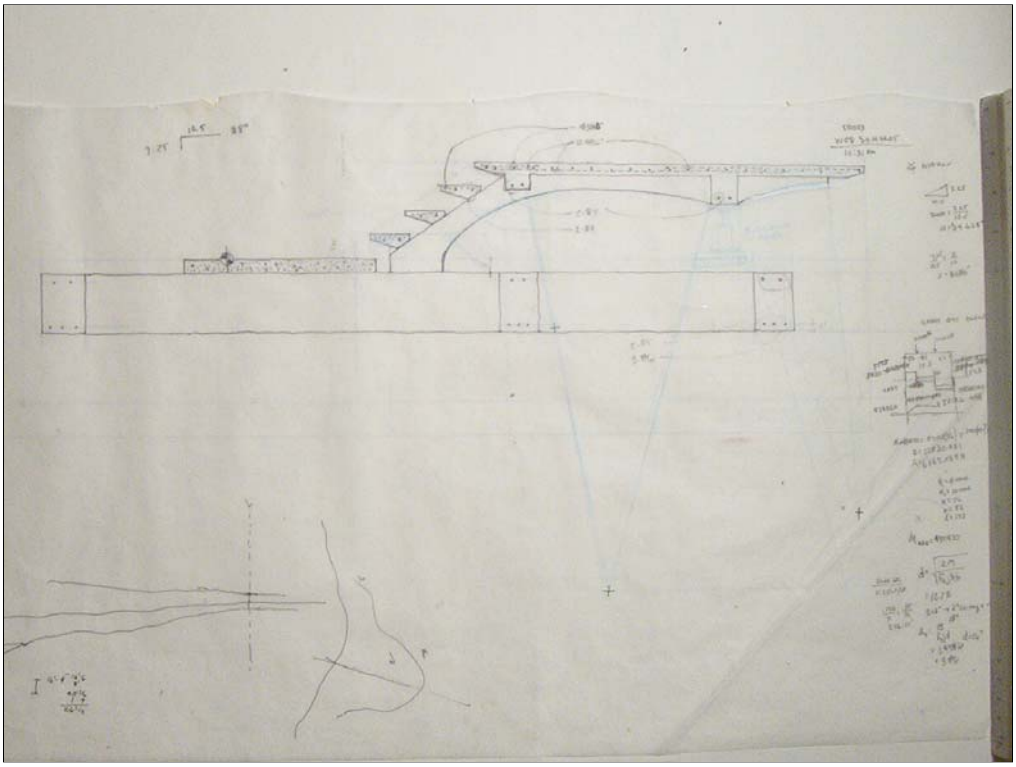
Rebar placements and edge distances are critical. The edge distances/coverage dimensions to resist corrosion through penetration of moisture through the face of concrete. Vertical placement is critical due to the support conditions of the thin stair planks 3.5” thick tapering to 1.5” at front face. The cantilever produces tension at the top of the concrete tread while the span between the supports produces a tension at the bottom face, rebar must be placed at both top & bottom and must stay in place during pour. Tie wire is used to secure the bars together and prevent them from moving. Small chunks of concrete blocks are used as chairs to keep the bars off the correct distance off the bottom of the form which will produce the bar coverage below.



Curved bars can be seen in the vaulted rib under the landing. Tread rebar is simply laid in at this point and is not yet tied or supported. Alum. Plank is set up to enable working the concrete/rebar while not standing on/in it and upsetting the rebar locations.

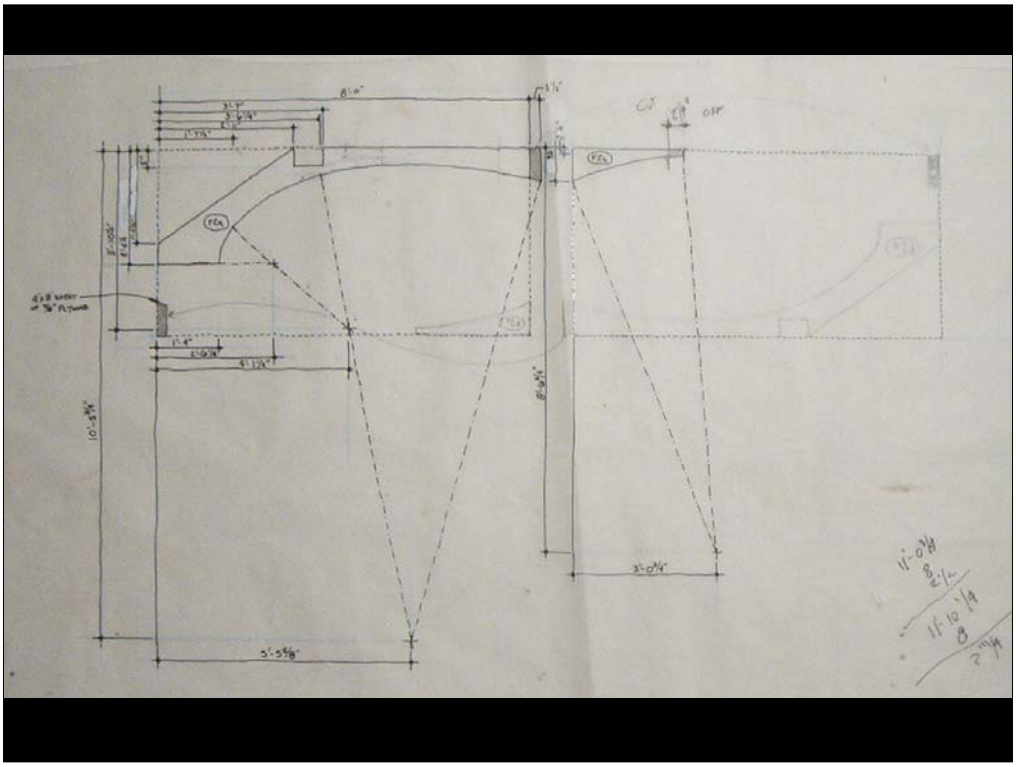


Bars at front edges were coated with epoxy to further ensure durability and resistance to corrosion from possible salt moisture intrusion.

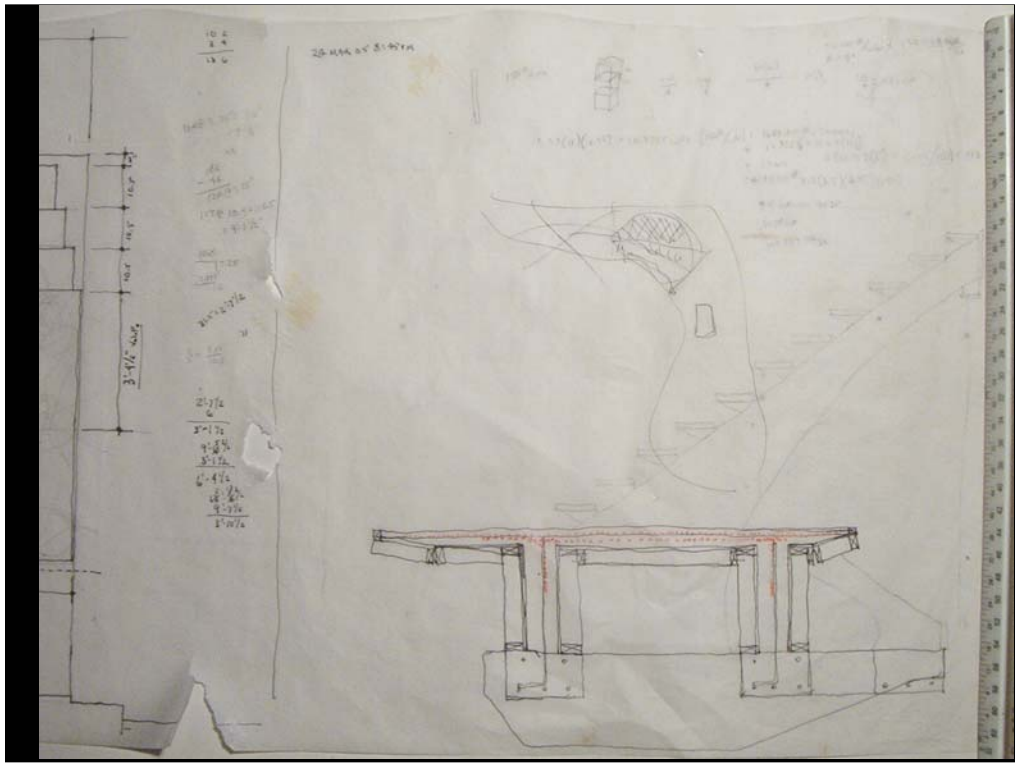


Section drawings with beam depths based on calculations of moments and moment diagrams define the form sections and how they will be joined to allow removal after curing.

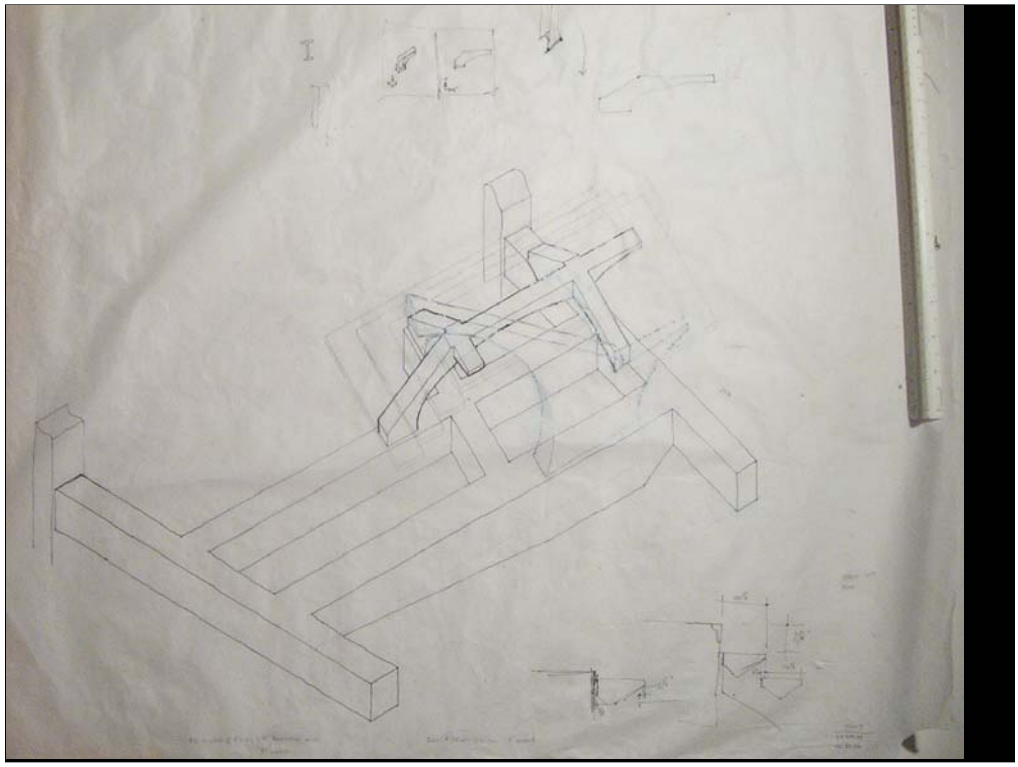
High tech methods are used to support the form system under the weight (150#/cuft) of the wet concrete while it is poured.



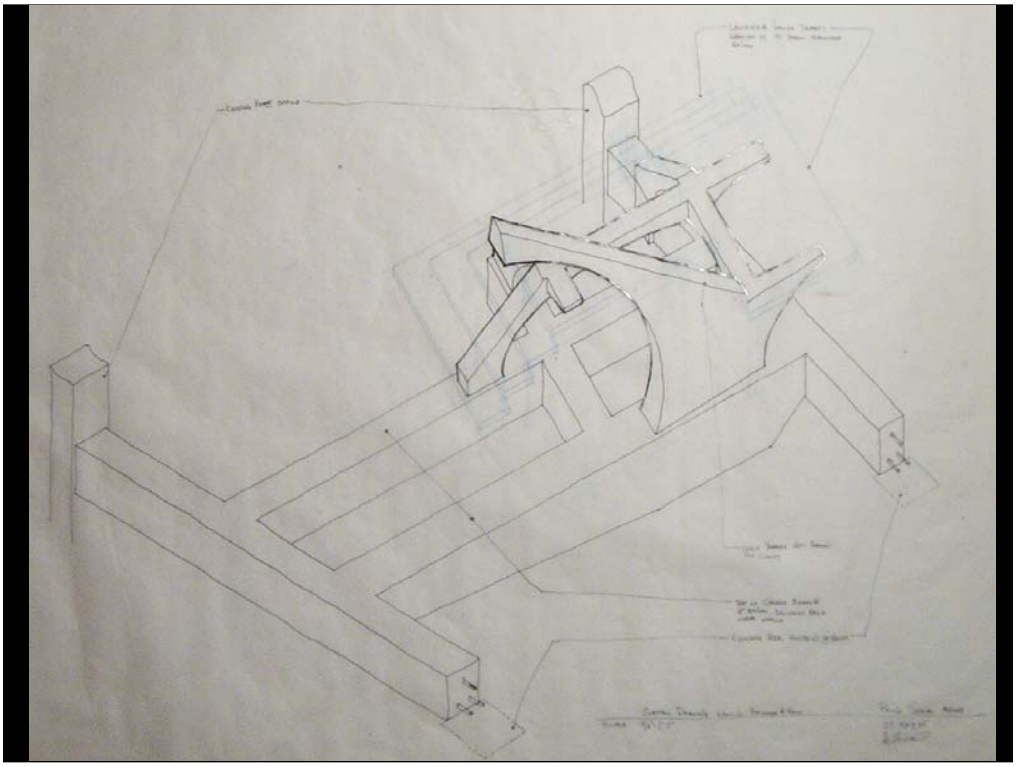
Techniques practiced in past projects – twisted form projects – are used to define/quantify the forms for the project.



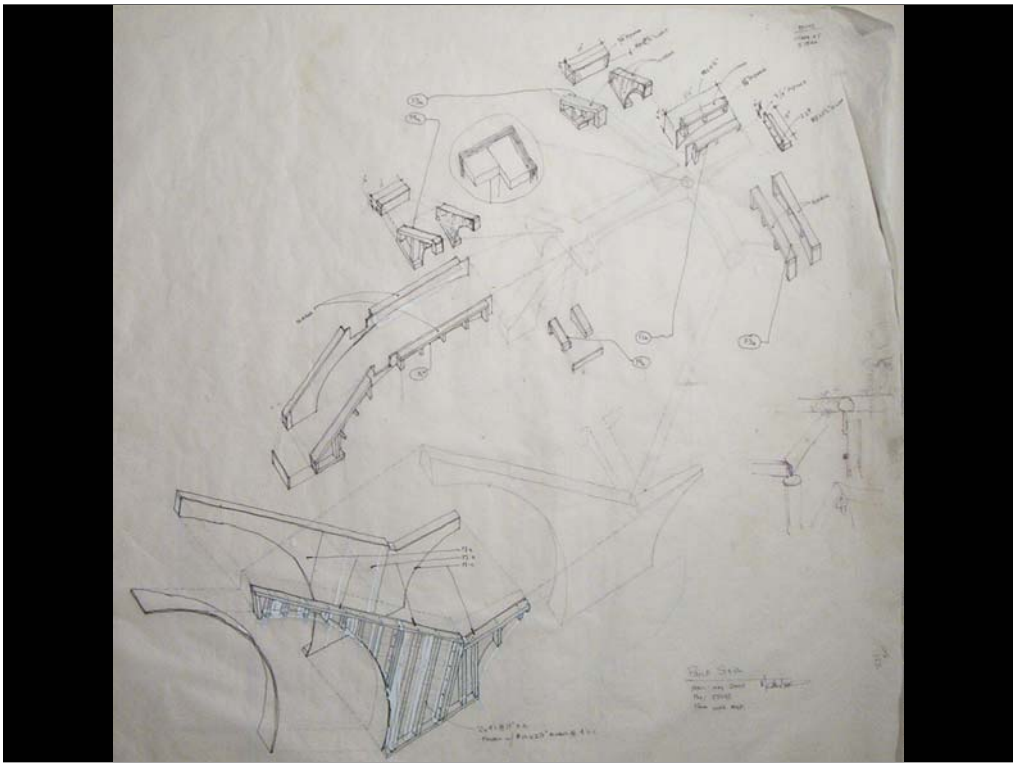
Formwork concept defined to ensure/allow it all to be removed afterward.



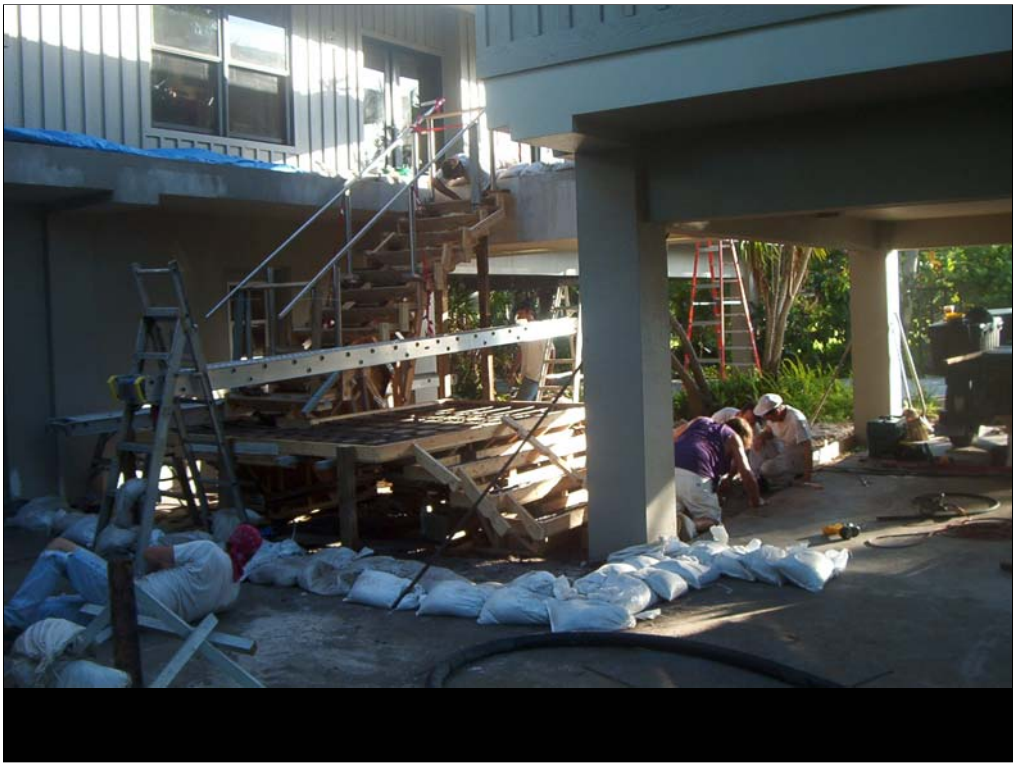
Stair base structure with main stringer ghosted. To define formwork sections.



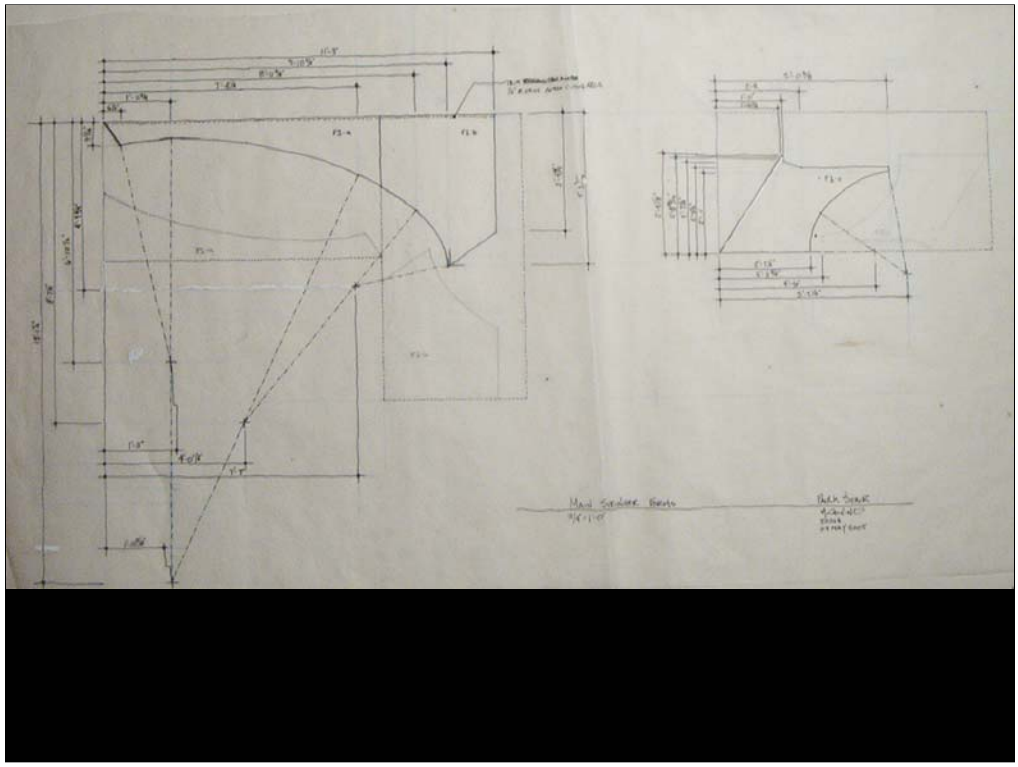
Main stringer and form study.



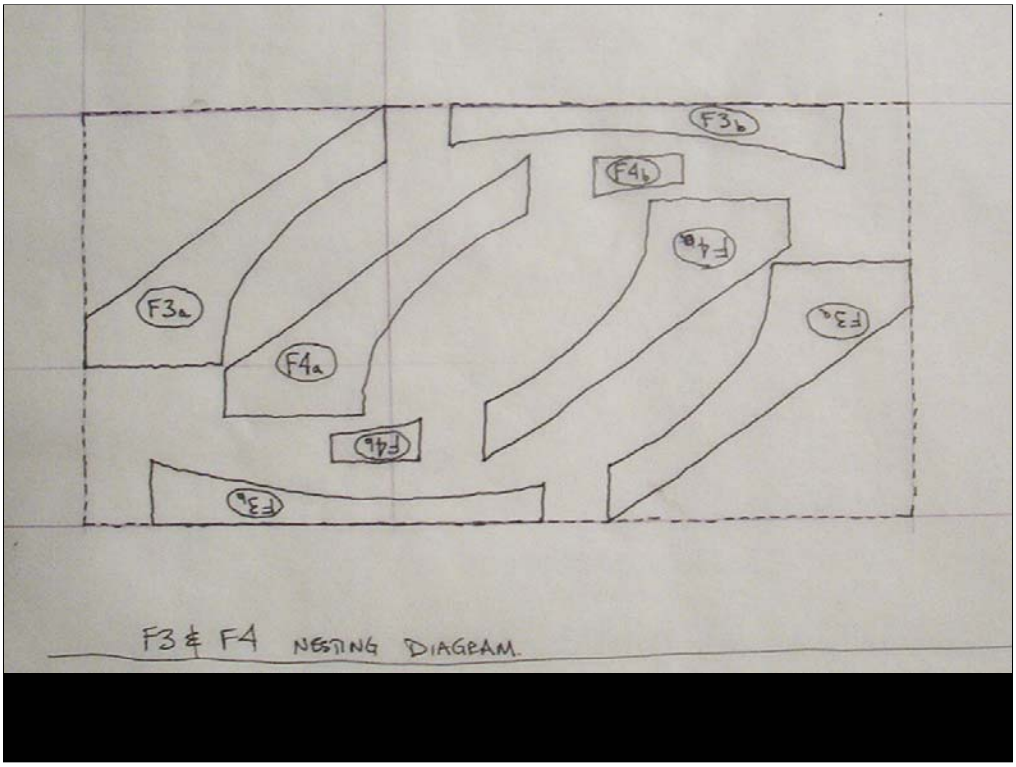
Formwork main drawing – drawn as a series of overlays on the exonometric drawings of the stringer and lower structure on tracing paper.



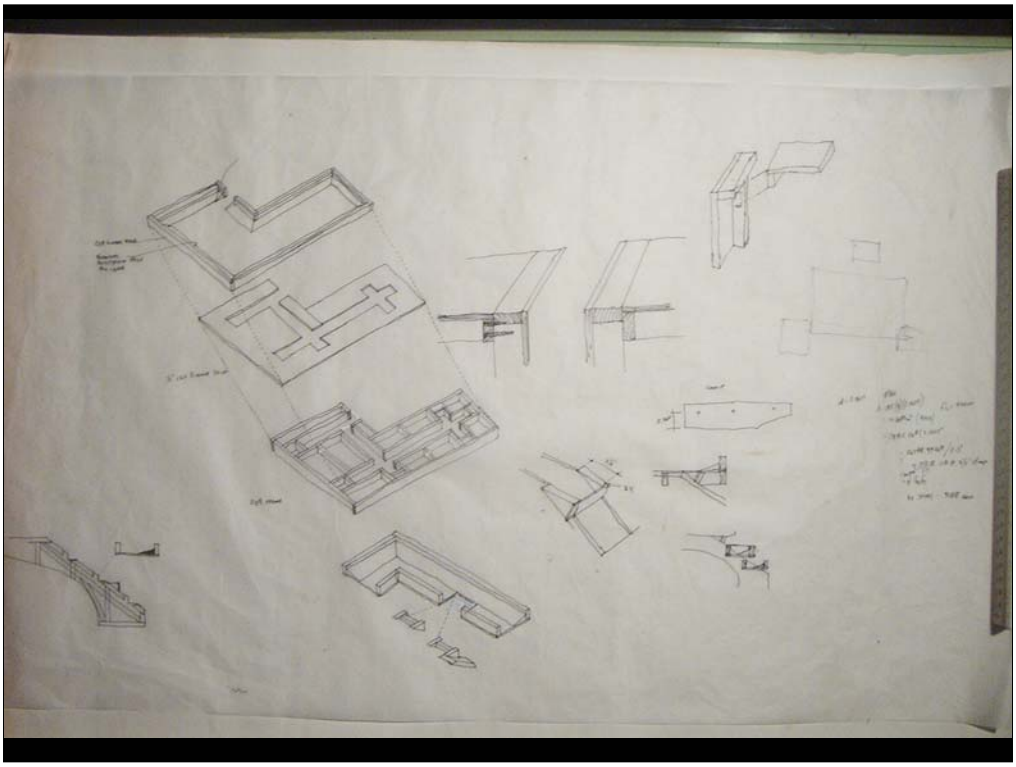
Completee forms, days before the pour.



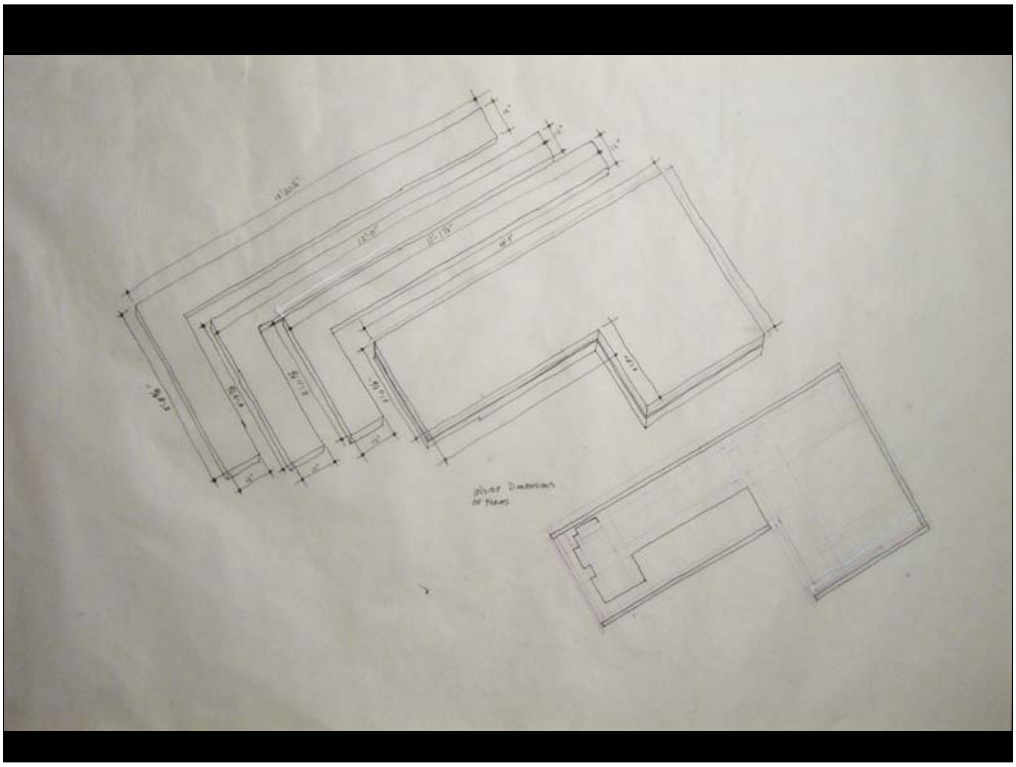
Form side drawings defining ‘cut sheets’ for Robert and crew. Shop drawings were made in the field on the sheets of plywood.



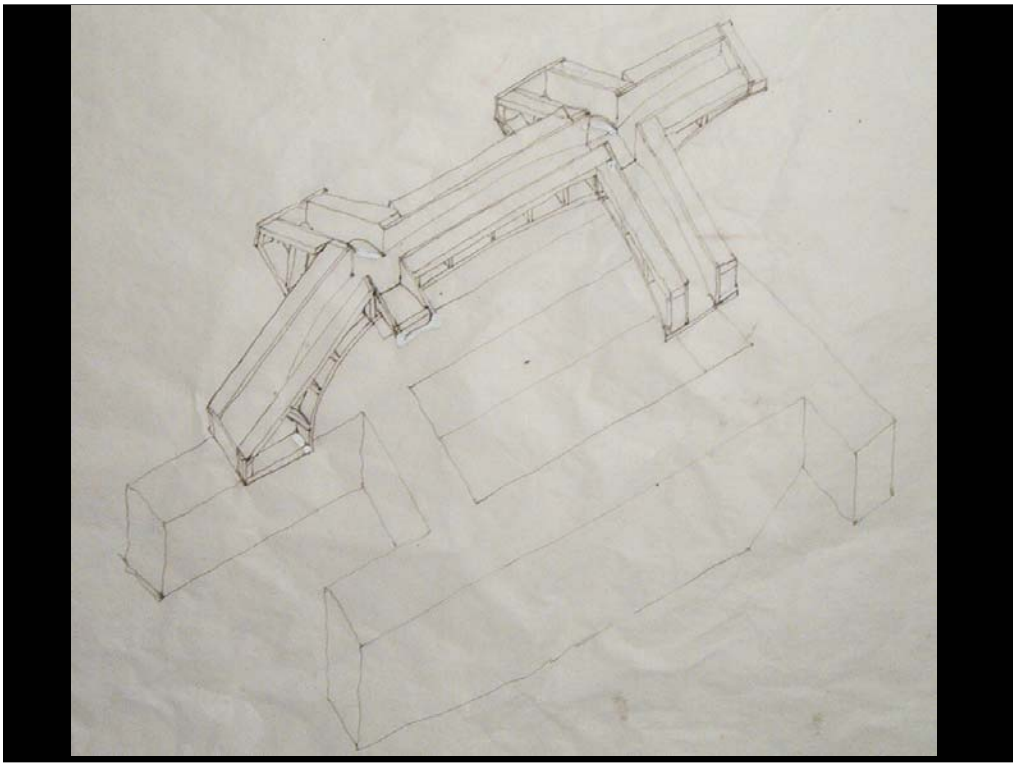
For the lower stair structural ribcage.



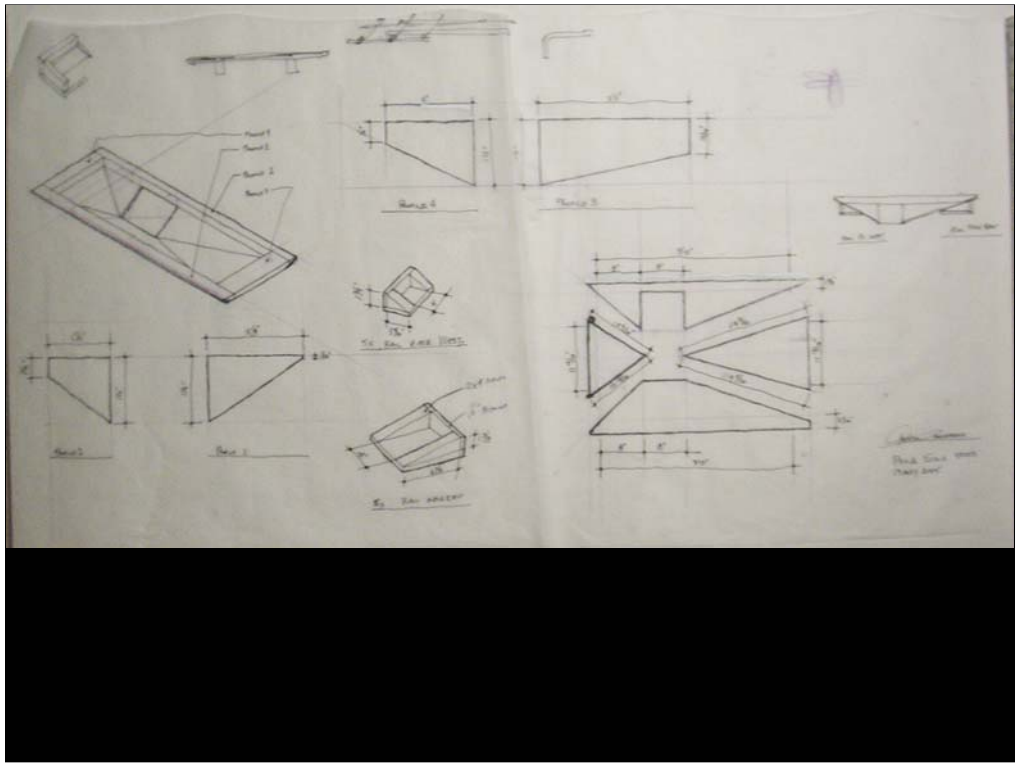
Landing and lower stair tread form concept drawing.



Landing and lower tread dimension drawings to define form drawing

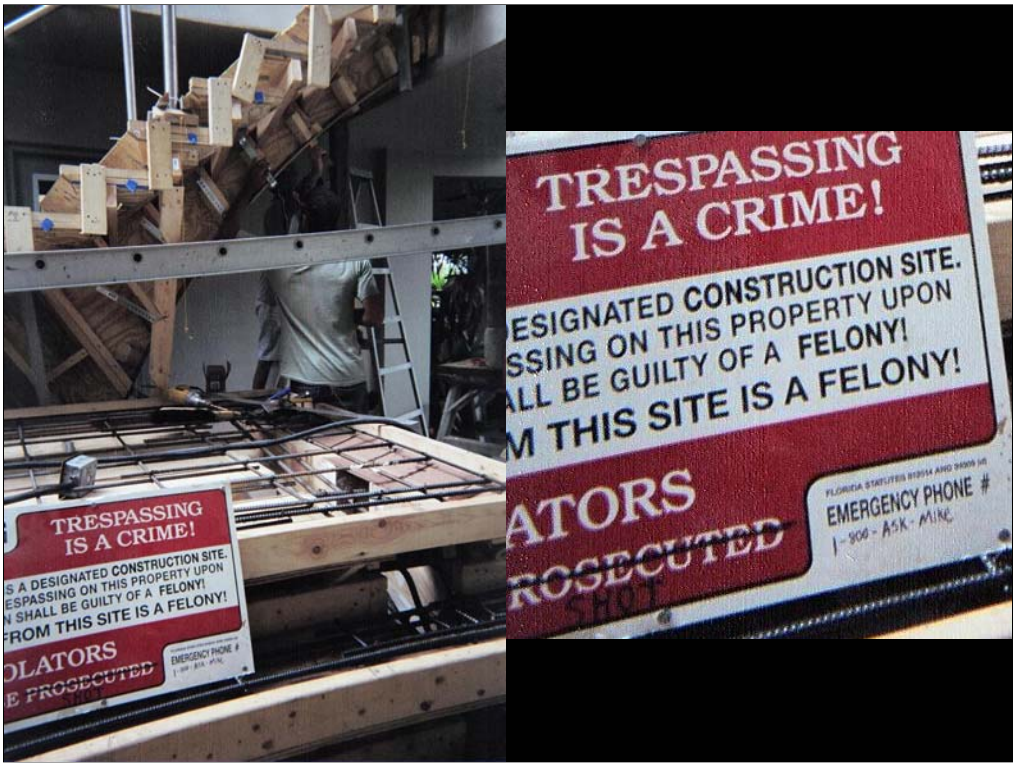


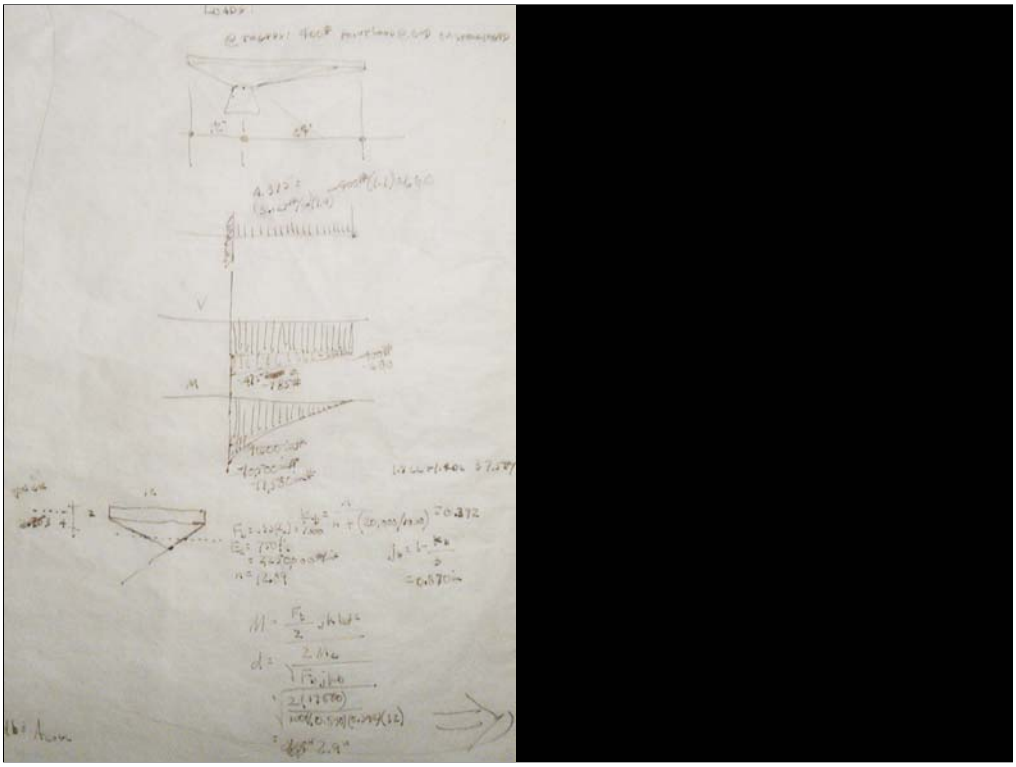
Lower ribcage forms assembled.



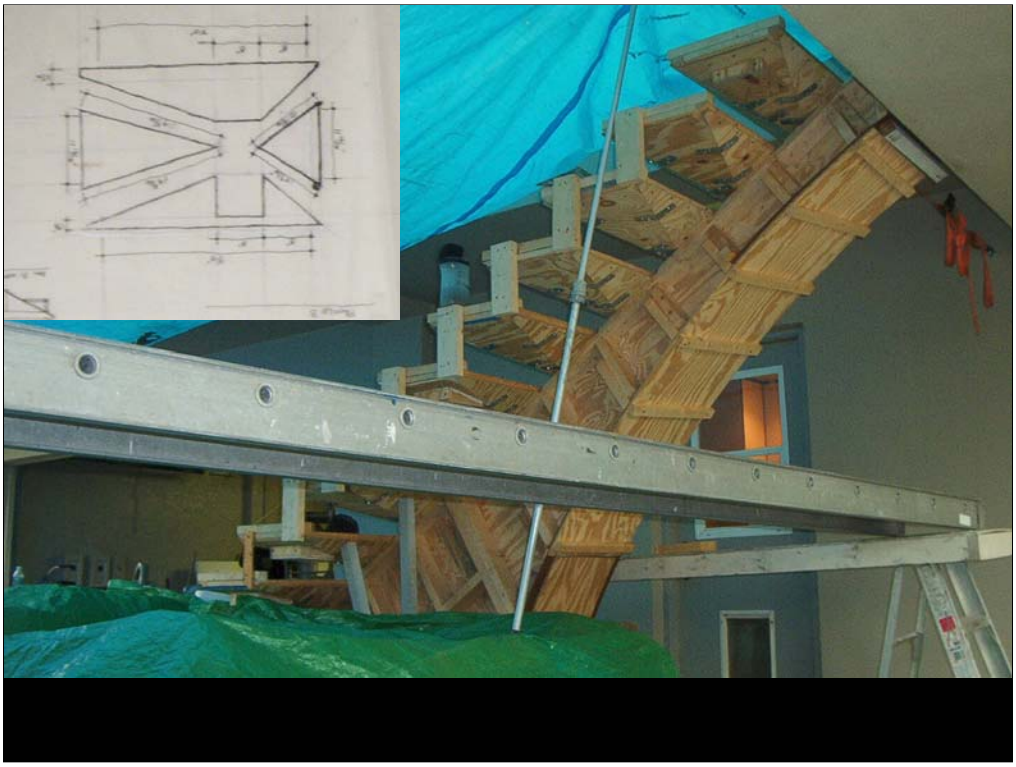
Tread box form development/shop drawing. Small box at lower center is for the railing vertical anchor point to allow sufficient depth of ‘beam’ to develop the moment forces imparted by the railing vertical (200# lateral load at top of rail at any point = 200#*3.5’ = 500ft# moment) = need more depth under railing embeds for overlap with lower bars in tread.

Tread boxes with rail verts in place.

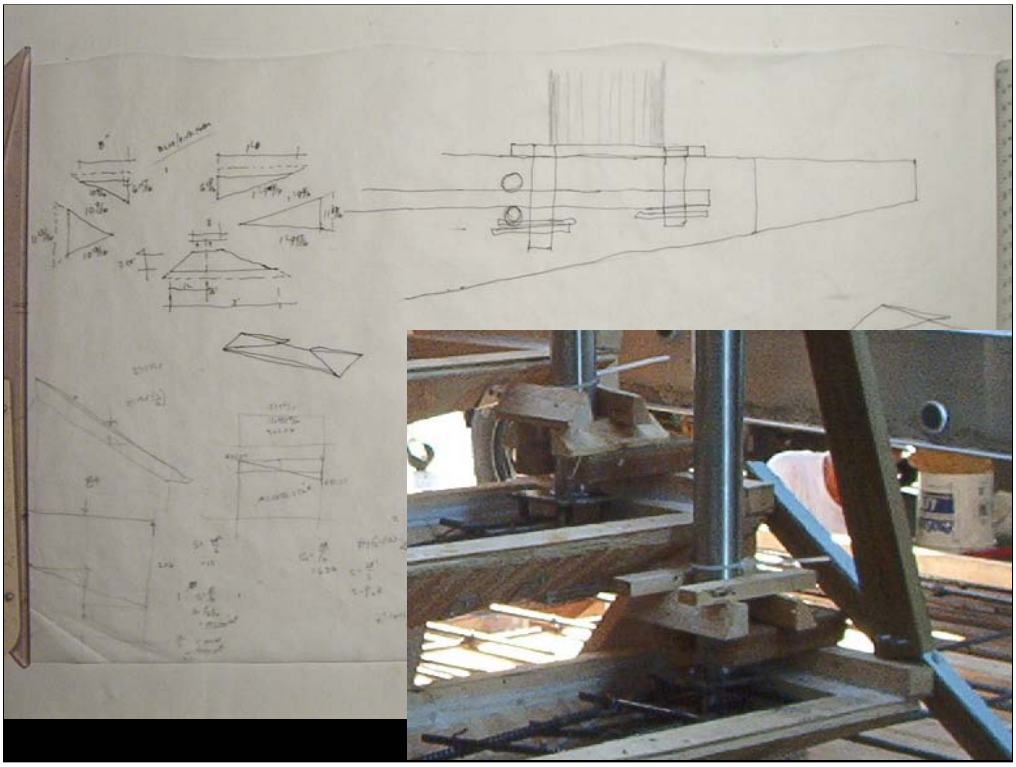

TRESPASSING
IS A CRIME!
ESIGNATED CONSTRUCTION SITE.
SSING ON THIS PROPERTY UPON
LL BE GUILTY OF A FELONY!
M THIS SITE IS A FELONY!
ATORS
ROSECUTED
EMERGENCY PHONE #
1-800-ASK-MIKE
TRESPASSING
IS A CRIME!
S A DESIGNATED CONSTRUCTION SITE.
ESPASSING ON THIS PROPERTY UPON
N SHALL BE GUILTY OF A FELONY!
FROM THIS SITE IS A FELONY!
OLATORS
E PROSECUTED
EMERGENCY PHONE #



Shear and moment diagrams for the stair treads used to solve for Area of steel using formula As=M/Fsjd.



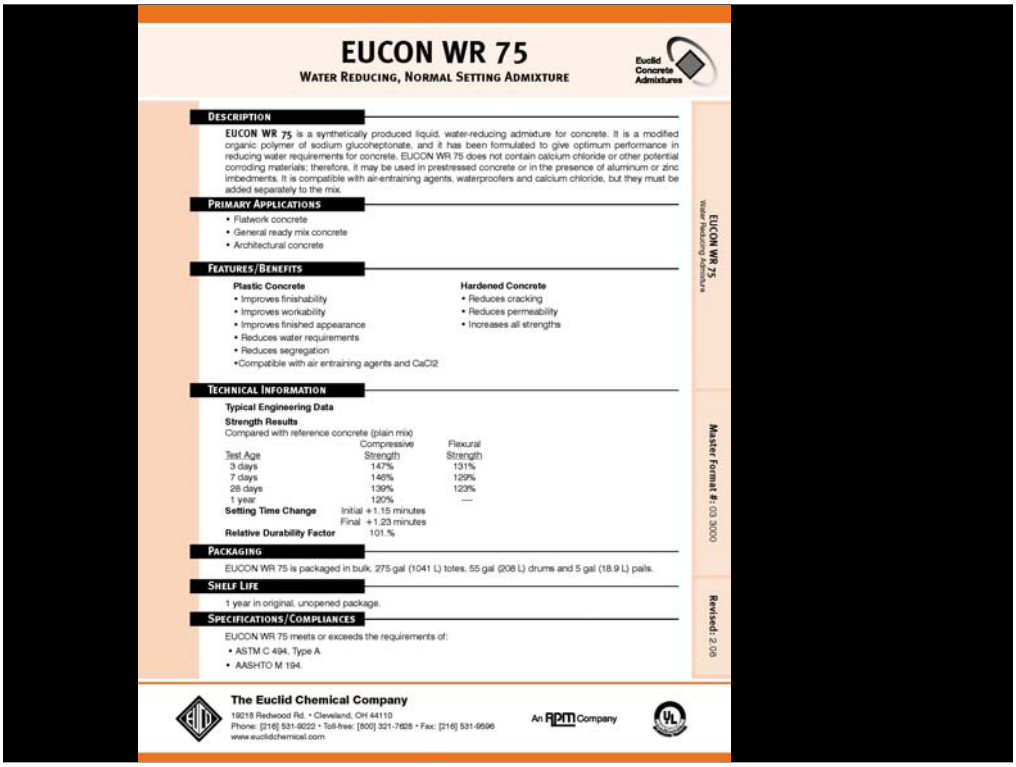
Stair tread boxes installed on the forms. The tread boxes serve to hold the sides in their ‘twisted’, tapered position as the bottom curve of the stringer is 10” wide for compressive strength and to accommodate rebar coverage while the top, straight edge of the stringer (beneath the tread boxes) is 8”. The steel straps serve to make the faceted shape without nailing form the inside. Flattened surfaces defining the tread boxes.



Guardrail vertical detail of stud embeds and the relationship to both the edge of the form (edge of conc.) and to the structural bars for the treads.

Detail for railing embed. Piece of SS rod with a washer welded to the bottom of it. The rails must be held in place where they are to be when finished. Essentially they had to be fastened with forms to ‘hover’ over the stair form box while keeping the embed studs off the bottom of the form.

Flowability of concrete, must be liquid enough to run into cracks and corners and between rebar but must set enough to not flow over the forms as it is pumped. Timing is critical and must pumped slowly so it can set up enough at each level to resist the hydrostatic pressure & flow over. An admixture that will reduce permeability (keep water & weather out of pours), increase compressive strength, and increase flexural strength, without affecting the set time. Much of the reason for the admix was to insure to a greater degree that the rebar, which in many cases is fairly close to the surface of the concrete (~3/4" in some cases) will not corrode due to salty, moist air from the bay.



EUCON WR 75

WATER REDUCING, NORMAL SETTING ADMIXTURE

Euclid Concrete Admixtures

DESCRIPTION

EUCON WR 75 is a synthetically produced liquid, water-reducing admixture for concrete. It is a modified organic polymer of sodium glucoheptonate, and it has been formulated to give optimum performance in reducing water requirements for concrete. EUCON WR 75 does not contain calcium chloride or other potential corroding materials; therefore, it may be used in prestressed concrete or in the presence of aluminum or zinc imbedments. It is compatible with air-entraining agents, waterproofers and calcium chloride, but they must be added separately to the mix.

PRIMARY APPLICATIONS

- Flatwork concrete
- General ready mix concrete
- Architectural concrete

FEATURES/BENEFITS

Plastic Concrete
- Improves finishability
- Improves workability
- Improves finished appearance
- Reduces water requirements
- Reduces segregation
- Compatible with air entraining agents and $CaCl_2$

Hardened Concrete
- Reduces cracking
- Reduces permeability
- Increases all strengths

TECHNICAL INFORMATION

Typical Engineering Data

Strength Results
Compared with reference concrete (plain mix)

Test Age	Compressive Strength	Flexural Strength
3 days	147%	131%
7 days	146%	129%
28 days	139%	123%
1 year	120%	—

Setting Time Change Initial +1.15 minutes, Final +1.23 minutes

Relative Durability Factor 101.%

PACKAGING

EUCON WR 75 is packaged in bulk, 275 gal (1041 L) totes, 55 gal (208 L) drums and 5 gal (18.9 L) pails.

SHELF LIFE

1 year in original, unopened package.

SPECIFICATIONS/COMPLIANCES

EUCON WR 75 meets or exceeds the requirements of:
- ASTM C 494, Type A
- AASHTO M 194.

EUCON WR 75 Water Reducing Admixture

Master Format #: 03 3000

Revised: 2.08

The Euclid Chemical Company
19218 Redwood Rd. • Cleveland, OH 44110
Phone: [216] 531-9222 • Toll-free: [800] 321-7628 • Fax: [216] 531-9596
www.euclidchemical.com

An RPM Company

www.euclidchemical.com > admixtures> water reducers > Type A >

Competitor: Sika Corporation http://www.sikaconstruction.com/con.htm > concrete admixtures

Waiting for concrete to begin to set up (become stiffer – hydration process starts and the plastic mix begins to stiffen) At right, the mud can be seen flowing out the lower treads. The pour sequence is that you start at these points, fill these points up so that the hole is plugged first and let it sit so that it begins to hydrate at these points, then you can pour more above and it resists the hydrostatic pressure.

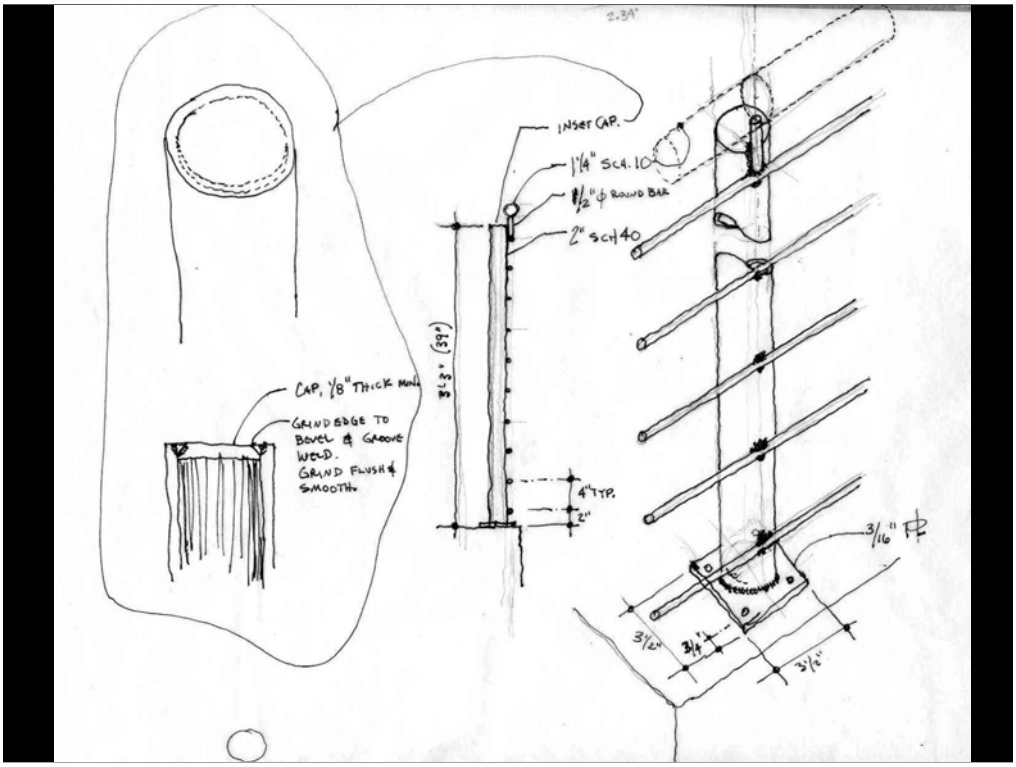
Left, filling the holes between layers. Right, the lower treads have set up enough to resist the pressure and the pour can continue for the moment.

The ready mox truck (Dunco) and James's concrete pump – heavy duty hydraulic piston pump can handle the high cement content of the 5000psi mix. Danny in foreground waiting for the truck to mix in the Eucon WR75 water reducing admixture – buckets in foreground.

Screeding nearly finished. Phase when concrete is leveled to tops of forms. & now . . . We wait. Final troweling must be done when the concrete is stiff enough to stand on and not leave a footprint . . . Plus with a water reducing admix, add about 30 – 45 minutes, then trowel it smooth with a steel trowel to take out any screed lines that may have been left from the process.

Forms stripped in 7 – 14 days to allow sufficient hardening to avoid chipping corners during prying to remove forms.

Landing needs no railing if less than 30” from floor below. Owner’s discretion, may put plants at edge or something.



Railing concept. Pipe cap – CNC laser cut tops to fit inside, weld flat & grind smooth, re-polish using grinder – 36 grit, then blending wheel on grinder – has polishing compound & is a cotton fiber based wheel. Then 80, 120, & 180 grit on belt sander brings to match the mill polish.

Corner concept change.

Acid based cleaner to remove heat tint produces when MIG welded.

Corners in railings.

Cantilever, independent structure.