HAIL DAMAGE REPAIR – SCRIM & SKYLIGHT REPAIR/REPLACEMENT REBID
BILLINGS PARMLY LIBRARY
510 North Broadway
Billings, Montana

OWNER:	**City of Billings**
OWNER'S REPRESENTATIVE:	**QuEst Corporation**
ARCHITECT:	**Bauer Group Architects PLLC**

DATE: July 2021

PROJ. NO.: P361-101

HAIL DAMAGE REPAIR – BILLINGS PARMLY LIBRARY REBID
SCRIM & SKYLIGHT REPAIR/REPLACEMENT
510 NORTH BROADWAY, BILLINGS, MT
JULY, 2021

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GENERAL PROVISIONS - IFB

Billings Parmly Library
510 N. Broadway, Billings, Montana 59101

INVITATION FOR BID (IFB)

Name of Good or Service Requested: General Contractor Bids for Hail Damage Repair

Contents:

A. Summary of Invitation for Bid

This bid is for the purpose of entering into a contract for General Contracting Services for Hail Damage Repair for the City of Billings. The successful bidder agrees to provide the City of Billings with an acceptable quality of equipment/service, performance and workmanship as determined by the City of Billings.

It is the purpose of this bid to obtain the best quality of equipment/service at the most favorable price to the City of Billings. Consideration will be given for the level of service offered and ability to meet stated specifications as outlined in the contract documents.

The lowest bid need not be accepted if it is documented that a specific supplier in the past has been a poor performer or has provided poor goods.

B. Instructions to Bidders

Sealed bids entitled General Contracting Services for Billings Parmly Library Hail Damage Repair for the City of Billings, Billings, Montana, will be received by the City Clerk up until 2:00 PM (MST) on Tuesday July 20th, 2021.

ATTENTION Notice regarding bid submittals, public bid openings and bid security maintenance. The process in which bids may be submitted, accepted and opened, has changed due to the COVID-19 response. All bids may be submitted to Billings City Clerk via email at bids@billingsmt.gov, or by mail to P.O. Box 1178, Billings, MT 59103 or 210 North 27th Street, Billings, MT 59101. Bid openings will be held live on the City's Facebook page: https://www.facebook.com/Billings-MT-City-Government-74352842013/. No hand-delivered bids will be accepted in order to prohibit the transmission of COVID-19. Bid tabulations will be posted for public viewing after the bids have been opened.

More specific additional information regarding this PROJECT may be obtained by contacting Mark Qualman via telephone at 406-850-9357, or via email at mark@costgurus.com.

Each bid must be accompanied by a Certified Check, Cashier's Check, **or Bid Bond payable to the City of Billings, Montana, in the amount not less than ten percent (10%) of the total amount of the bid.** The bid security will be retained by the City Clerk until the successful bidder enters into a contract with the City of Billings. If no contract is entered into, by the successful bidder, within sixty (60) days the security may be forfeited to the City of Billings.

Successful bidders will be required to furnish an approved Performance Bond, Labor and

Materials Bond, or Payment Bond in the amount of one hundred percent (100%) of the contract amount.

No bids may be withdrawn after the scheduled time for the public opening of bids, which is 2:00 PM (MST) on Tuesday, July 20th, 2021.

The right is reserved to reject any or all bids received, to waive irregularities, to postpone the award of the contract for a period of not to exceed sixty (60) days, and to accept that bid which is in the best interests of the City of Billings, Montana.

The City of Billings is an Equal Opportunity Employer. The Contractor and subcontractor shall abide by the requirements of 41 CFR 60-300.5(a) and 41 CFR 60-741.5(a), which prohibit discrimination against qualified protected veterans and/or qualified individuals on the basis of disability and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans and individuals with disabilities.

EXAMINATION OF DOCUMENTS

Before submitting a bid, the bidder shall:

a. Carefully examine the Standards and Specifications as well as all other attached documents.
b. Fully inform themselves of the existing conditions and limitations.
c. Include with the bid sufficient information to cover all items required in the specifications.

BID COMPLIANCE

It shall be the responsibility of the bidder to see that all bids are submitted to the office of the City Clerk before 2:00 PM (MST) on Tuesday, July 20th, 2021.

BID MODIFICATIONS

Bids shall be made on the forms provided herein; they shall not contain any recapitulation of the work to be done, except as allowed for in this offering. Modifications, additions or changes to the terms and conditions of this Invitation for Bid may be cause for rejection of the bid. Bids submitted on other forms may be rejected.

INTERPRETATION PRIORITY

Should a bidder find discrepancies in, or omissions from, the specifications, or be in doubt as to their meaning, bidder shall notify Mark Qualman, Owner's Representative at 406-850-9357, who will send written instructions or addenda to all bidders. The City will not be responsible for oral interpretation. All addenda issued prior to bid opening shall be

incorporated into and become a portion and part of the contract/agreement upon award. Questions received less than ninety-six (96) hours before the bid opening cannot be answered.

WITHDRAWAL OF BIDS

Bidders may withdraw their bid either personally or by written request at any time prior to the time set for bid opening. No bid may be withdrawn or modified after the time set for opening, unless and until the award of the contract is delayed for a period exceeding sixty (60) days.

BID PRICE VALID

Bidders must honor their bid price for sixty (60) days from the date of sealed bid opening.

CERTIFICATION

The bidder certifies that the bid has been arrived at by the bidder independently and has been submitted without any collusion designed to limit independent bidding or competition. The bidder further certifies that the materials, products, services and/or goods offered herein meet all requirements of the stated specifications and are equal in quality, value and performance with highest quality, nationally advertised brand and/or trade names.

Manufacturer's trade names, if used in specifications, are for the express purpose of establishing a standard of quality and coordination of design, not for the purpose of limiting competition.

INSURANCE

The bidder certifies that it/they shall maintain in good standing the insurance outlined below"

1. Workers' compensation and employer's liability coverage as required by Montana law.
2. Commercial general liability, including contractual and personal injury coverage's -- $750,000 per claim and $1,500,000 per occurrence.
3. Automobile liability -- $1,500,000 per accident.

Each policy of insurance required by this Section shall provide for no less than 30 days' advance written notice to the CITY prior to cancellation.

The CITY shall be listed as an additional insured on all policies except Professional Liability and Worker's Compensation Policies.

In addition, all policies except Professional Liability and Worker's Compensation shall

contain a waiver of subrogation against the CITY.

BIDDER shall comply with the applicable requirements of the Workers' Compensation Act, Title 39, Chapter 71, MCA, and the Occupational Disease Act of Montana, Title 39, Chapter 71, MCA. Bidder shall maintain workers' compensation insurance coverage for all members and employees of Bidder's business, except for those members who are exempted as independent contractors under the provisions of §39-71-401, MCA.

The certificate will be provided to the City prior to contract execution.

ELIGIBILITY

The successful bidder will be required to provide copies of the following, or the ability to obtain the following within 15 days of notification of contract award:

- Completed and signed the new vendor forms, if necessary (to be eligible for payment): http://mtbillings3.civicplus.com/DocumentCenter/View/26004
- City of Billings Business License: http://ci.billings.mt.us/981/Business-Licenses
- Montana Contractor's License: http://erd.dli.mt.gov/work-comp-regulations/montana-contractor/construction-contractor-registration
- Certificate of Workman's Compensation or Certificate of Exemption from Workman's Compensation: http://erd.dli.mt.gov/work-comp-regulations
- The successful bidder will be required to purchase a City business license and complete the new vendor forms in order to be eligible for payment.

EVIDENCE OF QUALIFICATION

Upon request of the City of Billings, a bidder whose bid is under consideration for award may be required to manifest satisfactory evidence of his financial resources, experience, the organization and equipment as well as service provisions bidder has available or will make available. In determining the lowest responsible bidder, in addition to price, the following considerations may be addressed:

a) The ability, capacity and skill of the bidder to perform the contract or provide the service required.

b) The character, integrity, reputation, judgment, experience and efficiency of the bidder.

c) Whether the bidder can perform the contract within time specified.

d) The quality of performance of previous contracts, agreements and/or performance.

e) Previous and/or existing compliance by the bidder with laws relating to the contract or services.

f) Such other information which may be secured having a bearing on the decision to award the contract.

CONTRACTORS' GROSS RECEIPTS TAX AND PREVAILING WAGE RATES

The bidder understands that, if applicable, all contractors or subcontractors working on a publicly funded construction project are required to pay or have withheld from earnings one percent (1%) of the gross contract price if the gross contract price is Five Thousand Dollars ($5,000) or more.

The bidder also understands that, if applicable and unless superseded by federal law, Montana law requires that contractors and subcontractors give preference to the employment of Montana residents for any public works contract in excess of $25,000 for construction or non-construction services in accordance with sections 18-2-401 through 18-2-432, MCA, and all administrative rules adopted pursuant thereto. Unless superseded by federal law, each contractor shall ensure that at least 50% of the contractor's workers performing labor on a construction project are bona fide Montana residents. The Commissioner of the Montana Department of Labor and Industry has established the resident requirements in accordance with sections 18-2-403 and 18-2-409, MCA. Any and all questions concerning prevailing wage and Montana resident issues should be directed to the Montana Department of Labor and Industry.

C. Contract Requirements and Specifications

Bidders shall examine:

Bidders to examine Project Specifications, Drawings & Photographic Images included in the Contract Bidding Documents. Also, there will be a **MANDATORY PRE-BID WALK-THROUGH for all BIDDERS** conducted onsite by QuEst Services Corp & Bauer Group Architects. BIDDERS to examine current existing conditions, laydown restrictions, hours of operation and building access.

Bidders to make note of Bidding Requirement to complete form entitled, "EXHIBIT A Quantity Sheet" attached at the end of this document that will need to be included with the Bidding Contractor Requirements at the time of bid.

MANDATORY PROJECT PRE-BID CONFERENCE: There will be a Mandatory, On-site Pre-Bid Conference, Tuesday, July 13th, 2021 at 11:00 a.m. MDT. Meeting will take place at 510 N. Broadway, Billings, Montana. The purpose of this meeting is to give bidders the opportunity to visually inspect the Project for Scope, Logistics, and Means & Methods determination. Bidders to acknowledge such on Bid Form where indicated.

D. Pricing and Addendum

Please bid net prices at which you will agree to furnish required goods or services.

TOTAL BASE BID PRICE - _____ dollars
(words)
and _____ cents ($_____)
(words) (figures)

TOTAL BID PRICE ALTERNATE #1 – NOT USED

PRICE -_____ dollars and
(words)
_____ cents ($_____)
(words) (figures)

Bidders to review and complete included Quantity Scope Survey Sheet, Appendix "A", for *QUANTITIES ONLY.* Listed quantities were generated by Insurance Company for purposes of Property Loss Valuation. Quantities will not be used to award contract to Low Bidder. Quantities generated by Bidding Contractor will be used to evaluate Insurance Companies initial valuation of Property Loss and to determine if Scopes of Work for this project are in line with actual damages observed by Bidders.

I/We acknowledge _____ addendum. Attended Pre-Bid? Yes / No (circle)
(#)

_____ _____
Company Name Date

_____
_____ _____
Contact Name (please print) Title

_____
Signature of Contact Position

By signing the above, I certify that I am authorized by the Company named above to respond to this request.

E. Standard Terms and Conditions

In case of default by the successful bidder or failure to deliver the goods or services within the time specified, the City Purchasing Agent, after written notice, may procure them from other sources and hold contractor responsible for excess costs occasioned thereby.

The specifications attached to the instructions to bidders establish a standard of quality desired by the City of Billings. Any bidder may submit quotations on any article which substantially complies with these specifications as to quality, workmanship and service. The City of Billings reserves the right to make its selections of materials or services purchased, based on its best judgment as to which articles substantially comply with the requirements of the specifications.

No alteration in any of the terms, conditions, delivery, quality, or specifications will be effective without prior written consent of the City of Billings.

No exception to delivery or service dates shall be allowed unless prior written approval is first obtained from the City of Billings.

The contractor warrants all articles supplied under this contract to conform to specifications, herein. The contractor will deliver a warranty stating that all articles supplied under the contract are fit and sufficient for the purpose manufactured, merchantable, and free from defects.

In the event the City is entitled to a prompt payment or cash discount, the period of computation shall commence on the date of delivery, or receipt of correctly completed invoices, whichever is later. If an adjustment of payment is necessary, the discount period shall commence on the date final approval for payment is authorized.

The contractor agrees not to discriminate against any client, employee or applicant for employment or for services, because of race, creed, color, national origin, sex or age with regard to, but not limited to, the following: employment upgrading; demotion or transfer; recruitment or recruitment advertising; layoffs and termination; rates of pay or other forms of compensation; selection for training; rendition of services. It is further understood that any contractor who is in violation of this shall be barred forthwith from receiving awards of any purchase order for the City unless a satisfactory showing is made that discriminatory practices have terminated and that a reoccurrence of such acts are unlikely.

The City reserves the right to cancel and terminate this contract forthwith upon giving 30 days written notice to the contractor. (This provision does not apply to the purchase of materials and equipment. A purchase order for materials and equipment is a binding contract.)

Should either party employ an attorney or attorneys or utilize the services of in-house attorneys to enforce any of the provisions hereof or to protect its interest in any manner

arising under this contract, the non-prevailing party in any action pursued in a court of competent jurisdiction agrees to pay to the prevailing party all reasonable costs, damages, expenses, and attorneys' fees, including fees for in-house attorneys, expended or incurred in connection therewith.

Where applicable, possible or required, bidder is required to submit descriptive literature, sample material, design sketches and detailed shop drawings. Failure to submit required items may result in rejection of the bid or termination of contract.

The successful bidder may not make any advertising or sale use of the fact that contract items are being used by purchaser and other approved agencies, under penalty of contract termination.

This Agreement shall be construed and enforced in accordance with the laws of the State of Montana. Venue for any suit between the parties arising out of this Agreement shall be the State of Montana Thirteenth Judicial District Court, Yellowstone County.

The contractor may not assign or subcontract the agreement, or the right to receive reasonable performance of any act called for by the contract, shall be deemed waived by a waiver by City of a breach thereof as to any particular transaction or occurrence.

Regardless of FOB point, contractor agrees to bear all risks of loss, injury, or destruction of goods and materials ordered herein and such loss, injury, or destruction shall not release contractor from any obligation hereunder.

All materials submitted in response to this IFB become public records under Article II, Section 9 of the Montana Constitution and §§ 2-6-102 and 7-1-4144, MCA and may be distributed by written request pursuant to Montana's Constitutional Right to Know or Public Records Acts.

Information provided in response to this IFB will be held in confidence and will not be revealed or discussed with competitors prior to award of Contract by Council. However, one copy of each bid submitted shall be retained for the official files of the Department and will become public record after award of the Contract.

Records and materials that are constitutionally protected from disclosure are not subject to the provisions of this section.

F. Conditions and Non-Collusion Agreement

To receive consideration, this form must be signed in full by a responsible, authorized agent, officer, employee or representative of your firm.

CONDITIONS AND NON-COLLUSION AGREEMENT

We have read and agree to the conditions and stipulations contained herein and to the Standard Terms and Conditions contained on the attached.

We further agree to furnish the product/services specified at the prices stated herein. We additionally agree to deliver the products/services to the location and by the date set forth herein, if applicable.

In signing this bid, you also certify that you have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a bid; that this bid has been independently arrived at without collusion with any other bidder, competitor or potential competitor; that this bid has not been knowingly disclosed prior to the opening of bids to any other bidder or competitor; that the above statement is accurate under penalty of perjury.

_____	_____
Legal Name of Firm/Corporation	Authorized Signature
_____	_____
Address	Printed Name
_____	_____
City/State/Zip	Title
_____	_____
Date	Telephone Number

G. Intent to Respond Form

Fax or email the following Intent to Respond form to _____ within two (2) days of the Bid Opening date of _____, 20_ even if your company chooses NOT to participate.

To: City of Billings – Department
Attn: _____
Phone: _____
Fax: _____
Email: _____

From: _____ Contact Name

_____ Company Name

_____ Company Address

_____

_____ Email Address

_____ Phone Number

_____ Fax Number

Please indicate whether or not you intend to submit a bid on: _____ by checking Yes or No.

We intend to respond by the specified due date:

Yes _____ No _____

_____ _____
Company Name Date

_____ _____
Contact Name (please print) Title

_____
Signature of Contact Position

By signing the above, I certify that I am authorized by the Company named above to respond to this request.

DIVISION 1 – GENERAL REQUIREMENTS

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to work of this section.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

The Project consists of: Hail Damage Repair – Billings Parmly Library
Scrim & Skylight Replacement Rebid

Project Location: 510 North Broadway, Billings, MT

Owner: City of Billings, Billings, MT

Contract Documents dated: July, 2021

Prepared by: Bauer Group Architects PLLC
P O Box 20939
Billings, Montana 59104

The Work consists of:

The work includes: That work as described or indicated in the project documents.

B. The Work specified herein will be performed under a single prime contract for General Construction.

C. The Drawings and Specifications are divided into separate divisions and sections of work for convenience. However, the Contractor shall be responsible for information contained in ALL subdivisions and may establish any subcontractual relationship which he may choose.

D. The general character and scope of the work is shown by the drawings. Where a portion of the work is delineated/drawn and the remainder is indicated, the portion delineated/drawn shall apply to all similar portions of the work.

E. Dimensions shall be followed in preference to scale measurements. Dimensions on the drawings are subject to field verification to accommodate installations.

F. Where a number is listed in the specifications (such as for gauges, weights, temperatures, amounts of time, etc.), the number shall be interpreted as that or better.

G. The work delineated by the contract documents, including construction details, construction means, methods, procedures and techniques necessary to perform the work, use of materials, selection of equipment and requirements of product manufacturers are consistent with: (1) Good and sound practices within the construction industry; (2) Generally prevailing and accepted industry standards acceptable for the work; (3) Requirements of any warranties applicable to the work; and (4) Applicable laws, ordinances, regulations, rules, codes and orders which apply to the contractor's performance of the work.

H. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

I. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

J. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

K. Field engineering provided by the Contractor is to include:

1. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

2. Submit the above information to the Architect 10 days prior to initiating related activities noting inconsistencies or compliance with information.

1.03 WORK SEQUENCE

A. The Work will be conducted in one phase.

1. Phase 1: Execute the work described in the drawings, specifications and addendums. Work of this phase shall be substantially complete, ready for occupancy within 120 calendar days of the Notice to Proceed.

2. Work Sequence: The drawings indicate a work sequence to accommodate the Owner's use of the facility during construction.

1.04 CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have partial use of the designated premises for construction operations, including use of the site as indicated. The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the project.

B. Use of Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public.

2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

3. Use of Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

4. Parking:

    a. All Contractor and Contractor employees shall comply with Owner's parking limitations. Unless otherwise indicated on the drawings, all Contractor and Contractor employee vehicles shall be parked in designated parking lots.

    b. If allowed only the maximum number of vehicles indicated may be parked in the project site areas designated and shall only be Contractor vehicles with company signs clearly visible.

    c. Access to project site shall be only by the route designated on the drawings. In cases where a different route must be used for a specific purpose, permission must be obtained from the Owner.

    d. Site staging areas for materials and equipment will be designated on the drawings if allowed. If not designated, staging is intended to be in the project site building. Staged materials and equipment may be secured on the ground surface or in trailers. Site staging areas shall be fenced. Vehicles not included among those allowed to be parked may not be used for staging of equipment, tools or materials.

    e. Traffic Plan – See Temporary Facilities.

1.05 OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy of Project Spaces: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate owner usage. Perform the Work so as not to interfere with the Owner's operations.

1.06 MISCELLANEOUS PROVISIONS

A. These documents do not include provisions for asbestos or hazardous material related work. Contractor is to notify Architect immediately if asbestos encountered on this project. Bauer Group Architects PLLC expressly states that it does not provide design services for environmental/asbestos-related issues. Use of asbestos on this project is prohibited.

B. SAFETY REQUIREMENTS: GENERAL – THE SAFETY MEASURES REQUIRED BY THE CONTRACT DOCUMENTS ARE NOT MEANT TO BE INCLUSIVE. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR SAFETY ON A 24-HOURS-PER-DAY, 7 DAYS-PER-WEEK BASIS AND SHALL TAKE WHATEVER ADDITIONAL MEASURES ARE NECESSARY TO INSURE THE HEALTH AND SAFETY OF THE BUILDINGS' OCCUPANTS, OR PEDESTRIANS AT OR NEAR THE CONSTRUCTION SITE AND ACCESS ROUTES AND OF ALL OTHER PERSONS IN ALL AREAS AFFECTED BY THE CONTRACTOR'S ACTIVITIES. Prior to the start of construction, the Contractor is to submit to the Architect, a detailed written plan specifying the safety procedures that will be followed. Include (but not by way of limitation) the following: Verbiage, size and locations of warning signs; construction sequence as related to safety; delivery of materials as related to safety. Revise the safety plan as required during construction and resubmit to the Owner's Representative.

C. Underground Utilities:

    1. Buried utilities, including but not limited to, electricity, gas, steam, air, water, telephone, sewer, irrigation, broadband coaxial computer cable, and fiber optic cables are very vulnerable and damage could result in loss of service.

2. Each utility must be contacted to assist in verifying utility and cable locations in the field. The locations of existing utilities and cables shown on the plans, as well as assistance provided, do not guarantee these locations. Utilities are not guaranteed to be shown on plans provided by the Architect and Owner. The Contractor is responsible to determine the location of each utility.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

3.01 SCHEDULE OF PRODUCTS ORDERED IN ADVANCE

END OF SECTION 01010

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01028 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to work of this section.

1.02 SUMMARY

A. This section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
B. Review and coordinate sections associated to allowances, unit prices, contract modification procedures and construction progress documentation as they may be related to this activity.

1.03 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
    1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
        a. Application for Payment Form
        b. Application for Payment Continuation Sheet(s)
        b. Submittals Schedule.
    2. Submit the Schedule of Values to Architect no later than 15 days after Notice of Award.
    3. Format and Content of Schedule of Values: Per AIA G703 Continuation Sheet, provide at least one line item for each specification division.

1.04 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by the Owner.
    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
    2. Retainage will be held the full term of the project without reduction.
B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the agreement.
C. Payment Application Forms: Use AIA Document G702 and Continuation Sheets G 703, samples included herein, as the form for Application for Payment and include the following:
    1. Item 7a. Net Payment after (Line 6 from Prior Certificate) and
    2. Item 7b. Less 1% Gross Receipts Tax
    (Note: 7b. deducted from 7a. Net Payment equals Current Payment Due.)
D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
E. Transmittal: Submit four (4) signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 48 hours. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each partial Application for Payment, submit partial waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
   1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
   2. When an application shows completion of an item, submit final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to the Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. Products list.
   2. Schedule of unit prices.
   3. Submittals Schedule (preliminary if not final).
   4. List of Contractor's staff assignments.
   5. Copies of building permits.
   6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   7. Initial progress report.
   8. Report of preconstruction conference.
   9. Data needed to acquire Owner's insurance.

H. Application for Payment at Substantial Completion per criteria of section 01700 Project Closeout: After issuance of the Certificate of Substantial Completion, submit Application for Payment showing percent of completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portion of the Work.
   3. Administrative actions and submittals that precede or coincide with this application shall include:
      a. Occupancy permits for the entire project or portion to be occupied from the agency having authority.
      b. Warranties (guarantees) and maintenance agreements.
      c. Test/adjust/balance records.
      d. Changeover information related to Owner's occupancy, use, operation and maintenance.
      e. Final cleaning.
      f. Written assurance that retainage is sufficient for all remaining claims.
      g. Application for reduction of retainage and consent of surety.
      h. Shifting insurance coverages.
      i. List of incomplete work, recognized as exceptions to Architect's Certificate of Substantial Completion with associated itemized cost of listed incomplete work.

I. Final Payment Application per criteria of Section 01700 Project Closeout: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
   5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."

6. AIA Document G707, "Consent of Surety to Final Payment".
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final, liquidated damages settlement statement.

PART 2 – PRODUCTS - NOT USED

PART 3 – EXECUTION - NOT USED

END OF SECTION 01028

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01035 - MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to work of this section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for handling and processing contract modifications.

1. Proposals made per this section must comply with the Supplementary General Conditions to be considered.

2. All modification matters must be submitted in writing within seven (7) days of request from the Owner of identified unforeseen condition.

1.03 CHANGES IN THE WORK

A. Per Paragraph 7.4 of the General Conditions the Architect may issue supplemental instructions authorizing changes in the Work, not involving adjustment to the Contract Sum or Contract Time as appropriate.

1.04 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Architect will issue a description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.

2. Within 7 days of receipt of a proposal request, submit an estimate of cost per the General and Supplementary General Conditions necessary to execute the change to the Architect for the Owner's review. Claims not provided within 10 days of request are subject to rejection or the item implemented by other resources.

a. Include a list of quantities of products required and unit costs, with the total amount of purchase to be made or deducted. Where requested, furnish survey data to substantiate quantities. Show differential of the bid conditions and proposed modification.

b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

B. Contractor-Initiated Proposals: When latent and/or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a written request for a change to the Architect.

1. Within ten (10) days include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time per the General and Supplementary General Conditions.

2. Include a list of quantities of products required and per the General and Supplementary General Conditions, unit costs with the total amount of purchases to be made or deducted. Where requested, furnish survey data to substantiate quantities. Document differential of the bid condition and the proposed modification.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts per the General Conditions.

4. Comply with requirements in section "Product Substitutions" if the proposed change requires substitution of one product or system for a product or system specified.

5. Pricing shall be similar to u nit prices derived from the Schedule of Values submitted for the project.

C. Proposal Request Form: Use forms provided by the Contractor for Change Order Proposals.

D. Do not include the contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.

E. No change to the Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.05 RESPONSE TIME

A. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor's handling, labor, installation, overhead, and profit. Submit claims within 7 days of receipt of the Architect's Supplemental Instruction (ASI), Change Order or Construction Change Directive authorizing work to proceed. The Owner will reject claims submitted later than 7 days.

1.06 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed immediately with a change in the Work, for subsequent inclusion in a Change Order.

1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

2. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive per the General Conditions.

After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.07 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of the Owner and the Contractor on AIA Form G701.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01035

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01060 - DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to work of this section.

1.02 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract. Add the following definitions: Remove, Remove & Salvage; Remove & Salvage for Reuse and Remove and Return to Owner.
B. "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.
D. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.
E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
F. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
G. "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
I. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operations, including installation, erection, application and similar operations.
J. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five (5) pervious projects similar in size and scope t this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
    1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
K. "Project site" is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on the Drawings and may or may not be identical with the description of the land on which Project is to be built.
L. Owner's Representative: To mean the person/firm to whom the owner has designated per the General Provisions of the construction documents.

M. Testing Laboratory: An independent entity engaged to perform specific inspections or tests of the work either at project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.
N. Unit Prices: Unit prices apply only to those items uncovered during construction or defined to be paid based on quantity. Items indicated to be affected on the drawings are to be included in the base bid.

1.03 DRAWING SYMBOLS

A. General: Except as otherwise indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., latest edition.

1.04 INDUSTRY STANDARDS

A. General Applicability of Standards: Applicable standards of construction industry have same force and effect (and are made a part of contract documents by reference) as if copied directly into contract documents, or as if published copies were bound herewith.

B. Reference standards (referenced directly in contract documents or by governing regulations) have precedence over non-referenced standards which are recognized in industry for applicability to work.

C. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.

D. Copies of Standards: Provide where needed for proper performance of the work; obtain directly from publication sources.

E. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authority(s) having jurisdiction, or other entity in the context of referencing a standard or publication. The following abbreviations and acronyms, as referenced in the Contract Documents, mean the associated names. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents. Where abbreviations and acronyms are used in the Specifications or other contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

AA	Aluminum Association 900 19th Street, NW, Suite 300 Washington, DC 20006 www.aluminum.org	(202) 862-5100
AAMA	American Architectural Manufacturers Assoc. 1827 Walden Office Square, Suite 104 Schaumburg, IL 60173-4268 www.aamanet.org	(847) 303-5664

AIA	American Insurance Association 1130 Connecticut Avenue,NW, Suite 1000 Washington, DC 20036	(202) 828-7100
AISC	American Institute of Steel Construction One East Wacker Drive, Suite 3100 Chicago, IL 60601-2001 www.aisc.web.com	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute 1101 17th Street, NW, Suite 1300 Washington, DC 20036-4700 www.steel.org	(202) 452-7100
BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 17th Floor New York, NY 10017-6603	(212) 661-4261
FM	Factory Mutual System 1151 Boston-Providence Tnpk. P O Box 9102 Norwood, MA 02062-9102 www.factorymutual.com	(781) 762-4300
ICC	International Code Council 5203 Leesburg Pike #708 Falls Church, VA 22041 www.intlcode.org	(703) 931-4533
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Avenue, Suite 1000 Chicago, IL 60603 www.gss.net/naamm	(312) 322-0405
NEMA	National Electrical Manufacturers Assoc. 1300 N 17th Street, Suite 1847 Rosslyn, VA 22209 www.nema.org	(703) 841-3200
NRCA	National Roofing Contractors Association O'Hare International Center 10255 W.Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.roofonline.org	(800) 323-9545 (847) 299-9070
SPRI	SPRI (Formerly: Single Ply Roofing Institute) 200 Reservoir St., Suite 309A Needham, MA 02494-3034 www.spri.org	(781) 444-0242

UL	Underwriters Laboratories, Inc. 333 Pfingsten Road. Northbrook, IL 60062 www.ul.com	(800) 704-4050 (847) 272-8800

Federal Government Agencies: Names and Titles of Federal Government standards or specification-developing agencies are often abbreviated. The following abbreviations and acronyms referenced in the Contract Documents indicate names of standards or specification-developing agencies of the Federal Government. Names and addresses are subject to change and are believed but are not assured, to be accurate and up-to-date of the date of the Contract Documents.

CFR	Code of Federal Regulations (Available from the Government Printing Office) Washington, DC 20401 (Material is usually published first in the "Federal Register") www.access.gpo.gov	(202) 512-1800
EPA	Environmental Protection Agency 401 M Street, SW Washington, DC 20460 www.epa.gov	(202) 260-2090
FS	Federal Specification Unit (Available from GSA) 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 www.gsa.gov	(202) 619-8925
GSA	General Services Administration F Street and 18th Street, NW Washington, DC 20405 www.gsa.gov	(202) 708-5082
NIST	National Institute of Standards and Technology (U.S. Dept. of Commerce) Building 101, #A1134 Rte. I-270 and Quince Orchard Rd. Gaithersburg, MD 20899 www.nist.gov	(301) 975-2000
USPS	U.S. Postal Service 475 L'Enfant Plaza, SW Washington, DC 20260-0010 www.usps.gov	(202) 268-2000

A. State Government Agencies: The following state government agencies develop standards referenced in the Contract Documents:

Montana Public Works Association Standards
Montana Department of Transportation
Montana Building Codes Division
Montana Department of Labor
Montana Dept. of Fire Prevention & Electrical Safety

1.05 SUBMITTALS

A. Permits, Licenses and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 - PRODUCTS STANDARDS

2.01 REFERENCES

A. Associations:

AIA	American Institute of Architects, 1735 New York Avenue N.W., Washington, D.C. 20006
ANSI	American National Standard Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036-8002
ASA	American Standards Association, 10 E. 40th Street, New York, New York 10016
ASTM	American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103
CS	Commercial Standard of U.S. Department of Commerce, Washington, D.C. 20025
CSI	Construction Specification Institute, Dupont Circle Building, Washington, D.C. 20036
EPA	Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460
IBC	International Building Code of International Code Council, 4051 West Flossmoor Road, Country Club Hills, IL 60478-5795
ICC	International Code Council, 5203 Leesburg Pike #708, Falls Church, VA 22041
IEEE	Institute of Electrical and Electronics Engineers, 345 E. 47th Street, New York, NY 10017-2394
IRI	HSB Industrial Risk Insurers, P O Box 5010, 85 Woodland Street, Hartford, CT 06102-5010
ISA	International Society for Measurement & Control, P O Box 12277, 67 Alexander Drive, Research Triangle Park, NC 27709
NEC	National Electric Code - National Fire Protection Association, Batterymarch Park, Quincey, MA 02269
NFPA	National Fire Protection Association, One Batterymarch Park, P O Box 9101, Quincy, MA 02269-9101
OSHA	Occupational Safety & Health Administration, (US Dept. of Labor) 200 Constitution Avenue NW, Washington, DC 20210
PS	Product Standard of NBS (US Dept of Commerce) Government Printing Office, Washington, DC 20402. For Product Standards Contact: CS & PS Specialist c/o NIST, Gaithersburg, MD 20899
UPC	Uniform Plumbing Code and Uniform Mechanical Code - International Association of Plumbing and Mechanical Officials, 5032 Alhambra Avenue, Los Angeles, CA 90032
UL	Underwriters Laboratories, 207 East Olive Street, Chicago, Illinois 60611
USDA	US Dept. of Agriculture, 14th Street & Independence Avenue SW, Washington, DC 20250

B. Names and addresses of other organizations appear in the technical specifications where their products are specified or are listed in Sweet's Architectural File.

C. Except where a specific date of issue is mentioned hereinafter, reference to specifications issued by the above named and other organizations shall mean the edition current on the date of the Advertisement for Bid.

END OF SECTION 01060

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01210 - PROCEDURES AND PERFORMANCES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract apply to work of this section.

1.02 SUMMARY:

The types of minimum requirements for procedural and performance work of a general nature include but are not necessarily limited to the following categories:

Pre-construction Conference
Pre-installation Conference
Coordination Meetings
Progress Meetings
Coordination and meetings.
Limitations for use of site.
Tradesmen and workmanship standards.
Inspections, tests and reports.
General installation provisions.
Protection

1.03 COORDINATION AND MEETINGS:

A. Pre-construction Conference:

1. Contact Architect to schedule a pre-construction conference and organizational meeting at the Project site or other convenient location prior to commencement of construction activities, including the moving of equipment onto the site, to review responsibilities and personnel assignments.

2. Attendees: The Owner, Architect and their consultants, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work. **THE CONTRACTOR AND THE CONTRACTOR'S JOB SUPERINTENDENT SHALL ATTEND THE MEETING, ALONG WITH APPROPRIATE SUBCONTRACTORS. ALL COMMUNICATION SHALL BE WITH THE CONTRACTOR. SIDE DISCUSSIONS WITH THOSE OTHER THAN POINTS OF CONTACT DESIGNATED ARE NOT VALID.**

3. Agenda: Discuss items of significance that could affect progress including such topics as:

    a. Tentative construction schedule
    b. Critical Work sequencing
    c. Designation of responsible personnel
    d. Procedures for processing field decisions and Change Orders
    e. Procedures for procession Applications for Payment
    f. Distribution of Contract Documents

g. Submittal of Shop Drawings, Product Data and Samples
h. Preparation of record documents
i. Use of the premises
j. Office, Work and storage areas
k. Equipment deliveries and priorities
l. Safety procedures
m. First Aid
n. Security
o. Housekeeping
p. Working hours
q. Other outlined items

B. Progress Meetings:

1. There are to be regularly scheduled progress meetings at the Project site as determined by the Architect.

2. Attendees: In addition to representatives of the Owner, Architect, Contractor and appropriate subcontractor, supplier or other entity integral with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

3. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include only topics for discussion as appropriate to the current status of the Project.

    a. Contractors Construction Schedule: Review progress since the last meeting. Contractor must determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Contractor to define schedule revisions required to ensure that current and subsequent activities will be completed within the Contract Time.

    b. Review the present and future needs of each entity present, including such items as:

        1. Interface requirements
        2. Time
        3. Sequences
        4. Deliveries
        5. Off-site fabrication problems
        6. Access
        7. Site utilization
        8. Temporary facilities and services
        9. Hours of Work
        10. Hazards and risks
        11. Housekeeping
        12. Quality and Work standards
        13. Valid Change Orders
        14. Documentation of information for payment requests

4. Reporting: The Architect shall distribute copies of minutes of the meeting within five calendar days to the Owner and Contractor and include a brief summary, in narrative form, of progress since the previous meeting and report comments or revisions to the meeting notes must be submitted in writing to the Architect within five calendar days of receipt.

5. Schedule Updating: The Contractor shall revise the construction schedule after each month's progress meeting whenever revisions to the schedule have been made or are recognized. Contractor is to issue the revised schedule at the next progress meeting.

E. General: The Contractor shall prepare and distribute to each entity performing work at project site, written instructions on required coordination activities, including required notices, reports and attendance at meetings.

F. The Contractor shall schedule, maintain performance, coordinate and observe on site activities of all subcontractors, suppliers, trades, etc., involved with the project.

G. Coordination Drawings: Where work by separate entities requires off-site fabrication of products and materials which must be accurately interfaced and closely intermeshed to produce required results, the Contractor shall prepare coordination drawings to indicate how the work shown by separate shop drawings will be interfaced, intermeshed, and sequenced for installation. Comply with submittal requirements of "Submittals" section.

H. Pre-Installation Conferences:

1. The Contractor shall conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.

2. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
    a. Contract Document Requirements
    b. Deliveries
    c. Shop Drawings, product Data and quality control samples
    d. Possible conflicts and proposed solutions.
    e. Compatibility solutions for the manufacturers selected by the Contractor.
    f. Time schedules
    g. Weather limitations
    h. Manufacturer's recommendations
    i. Compatibility of materials selected by the Contractor.
    j. Acceptability of substrate materials.
    k. Temporary facilities required to complete the work.
    l. Space and access needs to complete the work.
    m. Governing regulations
    n. Safety criteria.
    o. Inspection and testing requirements
    p. Required performance results of the subcontractors/suppliers.
    q. Recording requirements for record documents.
    r. Protection of installations.

3. The Contractor, if present, will record and distribute to the Owner and Architect significant discussions and agreements and disagreements of each conference, along with the approved schedule. The Contractor shall promptly distribute the record of the meeting to everyone concerned, after receiving concurrence with conference activities.

4. Do not proceed if the conference cannot be successfully concluded. The Contractor is to initiate whatever actions are necessary to resolve impediments to performance of Work.

I. Coordination Meetings – Contractor and Appropriate Subcontractor(s) or Supplier(s):

1. The Contractor shall conduct project coordination meetings at regularly scheduled times convenient for the parties involved with the current stage of construction. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

2. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

3. The Contractor will record meeting results and distribute copies to the Owner and Architect and to others affected by decisions or actions resulting from each meeting. No activities are to proceed which are contrary to the contract document requirements without written confirmation of the Architect.

1.04LIMITATIONS FOR USE OF SITE:

General: In addition to site utilization limitations and requirements shown on drawings, and indicated by other contract documents, administer allocation of available space equitably among entities needing access and space, so as to produce best overall efficiency in performance of total work of project.

The Contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site. Make arrangements with Owner to utilize site for storage of materials. Provide reasonable measures to protect completed portions and existing building from weather damage during the course of the project.

1.05TRADESMEN AND WORKMANSHIP STANDARDS:

GENERAL: UNDER DIRECTION OF A COMPETENT SUPERINTENDENT WHO IS PRESENT AT ALL TIMES WHILE WORK IS IN PROGRESS. Instigate and maintain procedures to ensure that tradesmen performing at site are skilled and knowledgeable in methods and craftsmanship needed to produce required quality-levels for workmanship in completed work. Remove and replace work which does not comply with workmanship standards as specified and as recognized in the construction industry for applications indicated. Remove and replace other work damaged or deteriorated by faulty workmanship or its replacement.

1.06INSPECTIONS, TESTS AND REPORTS

A. General: Required inspection and testing services are intended to assist in determination of probable compliances of the work with requirements, but do not relieve Contractor of responsibility for those compliances, or for general fulfillment of requirements of contract documents. Specified inspections and tests are not intended to limit Contractor's quality control program. Afford reasonable access to agencies performing tests and inspections.

B. Tests: All testing not denoted as by Owner is to be Contractor's responsibility. Copies of all results to be per paragraph "C" below. Note requirements in concrete work for contractor to obtain test samples and deliver them to testing agency.

C. Reports: Submit test/inspection reports, including agency's analysis of results and recommendations where applicable, in duplicate to Architect/Engineer except as otherwise indicated, and submit copies directly to governing authorities where required or requested.

D. All observations of tests called for in these documents shall have 48 hours prior notice to the Architect. The Architect may defer the request to the appropriate consultant for execution.

PART 2 - PRODUCTS (not applicable.)

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

A. Installer's Inspection of Conditions: Require installer of each major unit of work to inspect substrate to receive the work, and conditions under which the work will be performed, and to report (in writing to Contractor) unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to installer by the contractor.

B. Manufacturer's Instructions: Where installation include manufactured products, comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in contract documents.

C. Inspect each item of materials or equipment immediately prior to installation, and reject damaged and defective items.

D. Provide shims, fillers, attachment and connection devices and methods for securing work properly as it is installed; true to line and level, and within recognized industry tolerances if not otherwise indicated. Allow for expansions and building movements. Provide uniform joint widths in exposed work, organized for best possible visual effect. Refer questionable visual-effect choices to Architect for final decision.

E. RECHECK measurements, elevations and dimensions of the work, and adjust discrepancies as an integral step of starting each installation. Notify Architect in writing with adequate descriptions of any critical discrepancies prior to beginning work.

F. Install work during conditions of temperature, humidity, exposure, forecasted weather, and status of project completion which will ensure best possible results for each unit of work from non-compatible work, as required to prevent deterioration.

G. Coordinate enclosure (closing-in) of work with required inspections and tests, so as to avoid necessity of uncovering work for that purpose.

H. Mounting Heights: Except as otherwise indicated mount individual units of work at industry-recognized standard mounting heights, for applications indicated. Refer questionable mounting height choices to Architect/Engineer for final decision.

3.02 PROTECTION

A. Limiting Exposures of Work: To extent possible through reasonable control and protection methods, supervise performance of work in a manner and by means which will ensure that none of the work whether completed or in progress, will be subjected to damaging, or otherwise deleterious exposures during construction period.

END OF SECTION 01210

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01330 – SUBMITTAL PROCEDURES

PART 1 – PROCEDURES

1.01RELATED DOCUMENTS

Drawings and general provisions of Contract apply to work of this section.

1.02SUMMARY

A. This section includes mandatory requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
B. General: Electronic copies of CAD Drawings of the Contract Drawings may be provided by Architect for Contractor's use in preparing submittals. The contractor will request in writing and sign a waiver of responsibility regarding the use of electronic media and shall not reuse the media for any other use per the General Conditions.

1.03DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's review.
B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.04SUBMITTAL ACTION REQUIRED OF THE CONTRACTOR:

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
    1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that requires sequential activity.
    2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
        a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
B. Submittals Schedule: Refer to submittal schedule at end of this section and each specification section for submittal information. Provide product data and color samples within 15 days of Notice of Award. Shop drawings are to be submitted within 7 days of field verification by the contractor..
C. **Use by the Contractor of Shop Drawings not first reviewed by the Contractor and the Architect, are solely the contractor's responsibility and possible liability for non-compliance with the contract documents. .The Architect will return submittals from sources other than the Contractor to the Contractor for his review and resubmittal**.
D. The contractor shall review each submittal and check for compliance with the Contract Documents. Note corrections, verify quantities, coordinate approved substitutions and confirm field dimensions. Mark with approval stamp before submitting to Architect.
E. Approval Stamp: The contractor shall stamp each submittal with a uniform, approval stamp. Include project name and location, submittal number, specification section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
F. Any work that is done, or material ordered prior to the review or approval of such submittal(s), shall be at the contractor's sole risk.

G. Contractor shall check and verify all field conditions and is responsible for shop drawing errors and omissions. Contractor shall be responsible for deviations from contract documents delineated in the shop drawings.
H. Contractor to coordinate the implementation of change order construction change directives and field orders in shop drawings/submittals as they apply.
I. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.
    1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals.
    2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow 21 days for initial review of each submittal.
    3. If intermediate submittal is necessary, process it in same manner s initial submittal.
    4. Allow 15 days for processing each resubmittal. Resubmittal time by the A/E after the first resubmittal will be billed to the Owner and will be deducted from the contractor's contract sum.
    5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
J. Identification: Place a permanent label or title block on each submittal for identification.
    1. Indicate name of firm or entity that prepared each submittal on label or title block.
    2. Provide a space approximately 4 x 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
    3. Include the following information on label for processing and recording action taken:
        a. Project name
        b. Date
        c. Name and address of Architect
        d. Name and address of Contractor
        e. Name and address of subcontractor
        f. Name and address of supplier
        g. Name of manufacturer
        h. Unique identifier, including revision number
        i. Number and title of appropriate specification section
        j. Drawing number and detail references, as appropriate
        k. Other necessary identification
K. Deviations: The Contractor shall highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
L. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
    1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
    2. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.
M. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form.
    1. Submittal **must not deviate** from contract documents.
    2. Provide Contractor's certification based upon submittal review stating that information submitted **complies with requirements of the Contract Documents**.
    3. Transmittal Form: Use contractor's standard form.
    4. Transmittal Form: Provide locations on form for the following information:
        a. Project name
        b. Date
        c. Destination (To:)
        d. Source (From:)

e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal
g. Submittal purpose and description
h. Submittal and transmittal distribution record
i. Remarks
j. Signature of transmitter

N. Distribution: Furnish copies of final submittals to those entities as necessary for performance of construction activities. Show distribution on transmittal forms.
O. Use for Construction: Use only final submittals with mark indicating action taken by Architect and/or consultants.

PART 2 – PRODUCTS

2.01ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.
   1. Number of Copies: Submit eight copies of each submittal. Architect will return four copies. Mark up and retain one returned copy as a Project Record Document.
   2. Additional Submittal : Submit seven copies where copies are required for operation and maintenance manuals. Architect will retain two copies, remainder will be returned. Mark up and retain one returned copy as a Project Record Document.
   3. Refer to submittal schedule at the end of this section.
B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. Mark each copy of each submittal to show which products and options are applicable to the project.
   2. Include the following information, as applicable:
      a. Manufacturer's written recommendations.
      b. Manufacturer's product specifications.
      c. Manufacturer's installation instructions.
      d. Standard color charts.
      e. Manufacturer's catalog cuts.
      f. Wiring diagrams showing factory-installed wiring.
      g. Printed performance curves.
      h. Operational range diagrams.
      i. Mill reports
      j. Standard product operating and maintenance manuals.
      k. Compliance with recognized trade association standards.
      l. Compliance with recognized testing agency standards.
      m. Application of testing agency labels and seals.
      n. Notation of coordination requirements.
C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. **Do not** base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Include the following information, as applicable:
      a. Dimensions
      b. Identification of products
      c. Fabrication and installation drawings
      d. Roughing-in and setting diagrams
      e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
      f. Shopwork manufacturing instructions
      g. Templates and patterns

h. Schedules
i. Design calculations
j. Compliance with specified standards
k. Notation of coordination requirements
l. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but not larger than 30 by 40 inches.
4. Number of Copies: Submit copies of each submittal, as follows:
   a. Submittal: Submit seven prints where prints are required for operation and maintenance manuals. Architect will retain two prints; remainder will be returned. (Mark up and retain one returned print as a Project Record Drawing.)

D. Samples: Prepare physical units of materials or products, including the following:
1. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected.
2. Preparation: Mount, display, or package samples in manner specified to facilitate review of qualities indicated. Prepare samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
   a. Generic description of sample.
   b. Product name or name of manufacturer.
   c. Sample source
   d. Compliance with recognized standards
   e. Submit only available items.
   f. Delivery time
   g. Refer to individual Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
   h. Submit two samples.
3. Disposition: Maintain approved Samples at Project site for quality-control comparisons.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor and removed from the site.

E. Product Schedule or List: See submittal schedule at end of this section.
F. Delegated-Design Submittal: Comply with requirements in respective specification section.

2.02 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit two copies of each submittal.
2. Certificates and Certifications: Provide a notarized statement that includes signature of Contractor, testing agency, or design professional responsible for preparing certification.

B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person.
C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements and experience where required.
G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
J. Compatibility Test Reports: Prepare reports written by a qualified testing agency interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
K. Field Test Reports: Prepare reports written by a qualified testing agency interpreting results of field tests performed for compliance with requirements.
L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements.
M. Research/Evaluation Reports: Prepare written evidence, form a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for project. Include the following information:
    1. Name of evaluation organization
    2. Date of evaluation
    3. Time period when report is in effect
    4. Product and manufacturer's name.
    5. Description of product
    6. Test procedures and results
    7. Limitations of use.
N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."
O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's criteria for installing or operating a product or equipment. Include the following, as applicable:
    1. Preparation of substrates.
    2. Required substrate tolerances.
    3. Sequent of installation or erection
    4. Required installation tolerances.
    5. Required adjustments
    6. Recommendations for cleaning and protection.
Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
    1. Name, address, and telephone number of factory-authorized service representative making report.
    2. Statement on condition of substrates and their acceptability.
    3. Statement that products at project site comply with requirements.
    4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

S. Construction Photographs : Comply with requirements in Division 1 Section – Temporary Facilities.

T. Material Safety Data Sheets: This is solely the contractor's responsibility.

PART 3 – ARCHITECT'S ACTION

A. General: Submittals that do not bear Contractor's review comments and approval stamp may be returned by the Architect to the Contractor without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
1. Return for Contractor Review & Stamp
2. Reviewed.
3. Reviewed and revise as noted.
4. Correct as noted and resubmit
5. Rejected

Note: Items 3, 4 and 5 above must be addressed prior to fabrication or installation.

C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

(CONTINUED ON NEXT PAGE)

A. The following list is for convenience only. Any item listed here and not mentioned in a Technical Section of the Specifications, or vice versa, shall be submitted for approval.

SECTION/ ITEM	SHOP DRAWINGS	TESTS	PRODUCT SAMPLES	DATA	PROJECT SCHEDULES	INSTALL & OPER. BOOK	WARRANTY(S)	CLOSEOUT DOCUMENTS
DIVISION 1								
01210					10 days after Notice of Award			
01400		X			X			X
01700								20 days following substantial completion date
01740								20 days following substantial completion date
DIVISION 2								
02070				Photographs	X			
DIVISION 3								
N/A								
DIVISION 4								
N/A								
DIVISION 5								
05 70 00	X		X		X	X		
DIVISION 7								
07620	X		X	X				
07720	X			X				
07900				X				
DIVISION 8								
08 63 00	X			X		X		

B. All schedules to be provided within 10 working days of Notice of Award.

C. Record drawings. A "Brochure of Equipment" will be provided for the Owner at the completion of construction to aid in the operation and maintenance of ALL equipment. The Contractor shall maintain a "Field Marked" set of drawings showing exact locations of all concealed items. At the completion of the project, the marked prints shall be delivered to the Architect.
D. All warranties, guarantees, replacement stock to be provided within twenty (20) working days of substantial completion without exception.

END OF SECTION 01330

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.02 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

B. Temporary utilities required include but are not limited to:

1. Water – BY OWNER
2. Water Distribution
3. Power – BY OWNER
4. Lighting & Power Distribution
5. Telephone

C. Temporary construction and support facilities required include but are not limited to:

1. Temporary heat
2. Field offices and storage sheds – if needed.
3. Sanitary facilities, including drinking water
4. Dewatering facilities and drains
5. Temporary enclosures
6. Temporary Project identification signs and bulletin boards – personnel information.
7. Waste Disposal services
8. Construction aids and miscellaneous services and facilities

D. Security and protection facilities required include but are not limited to:

1. Temporary fire protection
2. Barricades, warning signs, lights
3. Sidewalk bridge or enclosure fence for the site
4. Environmental protection
5. Non-smoking policy
6. Registered offender information – provide list for Owner to consider
7. Courteous language required.
8. Traffic management/control for the project.
9. Weapon limitation on site regarding firearms and knives.

E. Facility criteria:
1. No smoking, drugs or alcohol on premises.
2. No firearms or weapons on premises.
3. Personnel listed on a registered offender list are to be conveyed to the Owner for review prior to accessing site.
4. Attire is to be proper for the project.

1.03 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Submit a schedule indicating implementation and termination of each temporary utility within 15 days of the date established for commencement of the Work.

1.04 QUALITY ASSURANCE

A. Regulations: Comply with industry standards, applicable laws, ordinances and regulations if authorities having jurisdiction, including but not limited to:

1. Building Code requirements
2. Health and safety regulations
3. Utility company regulations
4. Police, Fire Department and Rescue Squad rules
5. Environmental protection regulations
6. Conformance with curfew limitations, if any

B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

2. Electrical Service: Comply with NEA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.05 PROJECT CONDITIONS

A. Temporary Utilities: Define as part of the construction schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Provide materials as needed, undamaged new or previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Lumber and Plywood: Comply with requirements in Division-6 Section "Rough Carpentry."

1. For job-built temporary offices, shops and sheds within the construction area, provide UL labeled, fire rated lumber and plywood for framing, sheathing and siding.

2. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.

3. For safety barriers, sidewalk bridges & covers, and similar uses, provide minimum 5/8" thick exterior plywood.

C. Gypsum Wallboard: Provide gypsum wallboard complying with requirements of ASTM C 36 on interior walls of temporary offices.

D. Roofing Materials: Provide UL Class "A" standard weight asphalt shingles complying with ASTM D 3018, or UL Class "C" mineral surfaced roll roofing complying with ASTM D 249 on roofs of job-built temporary offices, shops and sheds.

E. Tarpaulins: Provide waterproof, fire-resistant, tarpaulins with flame-spread rating of 25 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.

F. Water: Provide potable water approved by local health authorities.

G. Open-Mesh Fencing: Provide plastic orange fence barrier.

H. Traffic Control Devices: Traffic cones, barriers, speed limit signs and warning equipment.

2.02 EQUIPMENT

A. General: Provide well maintained equipment. Undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

B. Water Hoses: Provide as required with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured NEA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

E. Lamps and Light Fixtures: Provide general service lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and label by UL, FM or another recognized trade association related to the type of fuel being consumed.

G. Temporary Offices: At Contractor's Option, provide with lockable entrances, insulated operable windows and serviceable finishes. Provide heated and conditioned units adequate for normal use.

H. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
2. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
3. Safety Showers: Provide eye-wash fountains and similar facilities for convenience, safety and sanitation of personnel.
4. Toiletries: Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.

I. Temporary Toilet Units: Comply with health regulations. Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

J. First Aid Supplies: Comply with governing regulations.

K. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

1. Comply with NFPA for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

3. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.

4. Use Charges: Cost of use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be accepted as a basis of claims for a Change Order.

B. Water Service: Install water distribution hoses of size and pressures adequate for construction.

C. Temporary Electric Power Service: The Owner shall provide electrical power for construction operations at no cost to the Contractor. Coordinate electrical usage required with Owner for installation of the temporary service.

1. Provide weather tight, grounded temporary electrical service-entrance and distribution system, with ground-fault circuit interrupters and ground-fault interrupter features of proper types, sizes, electrical ratings and characteristics to fulfill project requirements. Comply with applicable requirements of IEEE, NEMA and UL standards and governing regulations.

2. Service: Comply with IEEE pertaining to installation of temporary wiring service and grounding. Provide meters, transformers, and overcurrent protective devices at main distribution panel for power and light circuitry. Provide disconnects for equipment circuits.

3. Power Distribution System: Provide circuits of proper sizes, characteristics, and ratings for each use indicated. System to comply with IEEE and OSHA requirements for specific uses. Provide as required to protect wiring on grade, roofs, decks or other areas exposed to possible damage. Provide 20 amp, 4-gang receptacle outlets, equipped with ground-fault circuit interrupters, reset button and pilot light, spaced so interrupters, reset button and pilot light, spaced so that a 100 foot extension cord can reach each area of work. Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide warning signs at power outlets that are other than 110/120 volt. Provide outlets of proper configuration to prevent insertion of 110/120 volt plugs into higher voltage outlets.

4. Provide adequate capacity at each stage of construction. Prior to availability at the site, provide trucked-in services for start up of construction operations.

5. Exercise control over power usage to conserve energy. Turn off or de-energize all service to the site during non-use periods.

6. Electrical Outlets: Provide properly configured NEA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

7. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

D. Temporary Lighting: Provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Telephones: Provide temporary telephone service for personnel engaged in construction activities, throughout the construction period. Provide cellular telephone, operational and on site at all times.

F. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.

2. Connect temporary sewers to the municipal system as directed by the sewer department officials.

3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

G. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Locate temporary construction and support facilities for easy access.

1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. If needed, provide noncombustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.

C. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

1. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.

a. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

2. Heating Units: Provide temporary heating units that have been tested and label by UL, FM or another recognized trade association related to the type of fuel being consumed.

D. Storage and Fabrication Sheds: As required install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.

E. Drinking Water: Provide drinking water where needed, including paper supply.

F. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

2. Install tarpaulins securely, with incombustible wood framing and other materials. Close building openings of 25 square feet or less with plywood or similar materials.

3. Close openings through roof decks and horizontal surfaces with load-bearing wood-framed construction.

4. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.

G. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

H. Project Identification and Temporary Signs: Prepare project identification and other signs of the size indicated; install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.

2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

I. Temporary Exterior Lighting: Install exterior yard lights so that signs are visible when Work is being performed.

J. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg. F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner. Do not use Owner's trash containers for any reason.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than on extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

D. Enclosure Fence: When work begins install an enclosure fence. Locate where indicated, the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent from easily entering the site, except by the entrance gates.

1. Provide open-mesh fencing with posts set in a compacted mixture of gravel and earth.

E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

F. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other

undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

G. Traffic Control: Arrange traffic control apparatus per the jurisdiction having authority. Submit a plan to the City of Billings for approval 45 days prior to initiating the plan.

3.05 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.

2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

2. Remove temporary paving that is not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances which might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:

a. Replace air filters and clean inside of ductwork and housings.

b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.

c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01500

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01600 - PRODUCTS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to work of this section.

1.02 DESCRIPTION OF REQUIREMENTS

A. Definitions: "Products" is defined to include items for incorporation into the work. "Materials" is defined as products which make a substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, installed or applied to form units or work. "Equipment" is defined as products with operational parts, including products with service connections (wiring, piping, etc.). Definitions in this paragraph are not intended to negate the meaning of other terms used in contract documents.

B. Substitutions: The requirements for substitutions do not apply to specified Contractor options on products and construction methods. Requested prior approval substitutions during bidding period, approved by Addendum prior to Contract Date, are included in contract documents and subject to requirements for substitutions. Contractor's determination with governing regulations and orders by governing authorities **do not constitute "substitutions"** and **do not constitute a basis for change orders**.

C. Revisions or adjustments to contract documents, requested in writing by Owner, Architect, or Engineer, are "modifications" not "substitutions".

D. Contractor's requests after the award of the project for changes in products, materials and methods of construction required by the contract documents are considered requests for "substitutions" and are subject to requirements hereof. Only requests that benefit the Owner in time or cost will be considered otherwise the project is to be implemented as bid.

1.03 QUALITY ASSURANCE

A. Source Limitations: To the greatest extent possible, provide products, materials and equipment singular generic kind and from a single source.

B. Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product or materials, select an option which is compatible with other products and materials already selected. Compatibility is a basic general requirement of product/material selections and must be provided by Contractor.

1.04 SUBMITTALS

A. Requests for Substitutions: The Contractor is to submit 3 copies, fully identified for product or method being replaced by substitution, and fully documented to show compliance with intended performance. Include: data/drawings, description of methods, samples where applicable. Provide statement that substitutions will result in overall work equal-to-or-better than work originally indicated and provides a reduction in cost or time to be considered.

1.05 PRODUCT DELIVERY-STORAGE-HANDLING

A. General: Deliver, handle and store products in accordance with manufacturer's recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. In particular, provide delivery/installation coordination to ensure minimum holding or storage times.

PART 2 - PRODUCTS

2.01 GENERAL PRODUCTS COMPLIANCES

A. General: Required procedures include, but are not necessarily limited to, the following for various indicated methods of specifying:

1. Single Product/Manufacturer Name: Provide product indicated, except where known that named product is no longer produced.

2. "Or Equal": Where named products in specifications test are accompanied by the term "or equal", comply with these contract document provisions concerning "substitutions".

3. Standards, Codes and Regulations: Where compliance with an imposed standard, code or regulation is required, selection from among products which comply with requirements including those standards, codes and regulations, is required of the Contractor.

4. Visual Matching: Where matching of an established sample is required, final judgement of whether a product proposed by Contractor matches sample satisfactorily is Architect's judgement.

5. Visual Selection: Except as otherwise indicated, where specified product requirements indicate "...as selected from manufacturer's standard colors, patterns, textures..." or words of similar effect, the selection (complying with requirements) of color, pattern and texture is the Architect's selection.

2.02 SUBSTITUTIONS

A. Conditions: Contractor's request for substitution will be received and considered when extensive revisions to contract documents are not required and changes are in keeping with general intent of contract documents and properly submitted. The proposal must be of benefit to the Owner in time and cost to be considered.

B. Work-Related Submittals: Contractor's submittal of shop drawings, product data or samples which indicate work **not** complying with requirements of contract documents will not be accepted.

2.03 GENERAL PRODUCT REQUIREMENTS

A. General: Provide new products which comply with requirements, complete with accessories, trim, finish, safety guards, other devices and details needed for a complete installation.

1. Provide continually available products.

END OF SECTION 01600

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to work of this section.

1.02 SUMMARY

Definitions: Closeout is hereby defined to include general requirements near end of Contract Time, in preparation for final acceptance, final payment, normal completion of contract requirements, occupancy by Owner and similar actions evidencing completion of the work.

1.03 PREREQUISITES TO SUBSTANTIAL COMPLETION

A. General: Request in writing Architect's inspection for certification of substantial completion (for either entire work or portions thereof), complete the following and list known exceptions in request: Provide in writing notification of facility being ready for substantial completion.

1. In progress payment request coincident with or first following date claimed, show compliance with 9.8 of the General Conditions, completion for portion of work claimed as "substantially complete". Provide a list in writing of incomplete items, value of incompletion, and reasons for being incomplete.

2. Include supporting documentation for completion as indicated in these contract documents.

3. Submit statement showing accounting of changes to the Contract Sum.

4. Advise Owner of pending insurance change-over requirements.

5. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents within twenty (20) working days of substantial completion.

6. Obtain and submit release enabling Owner's full and unrestricted use of the work and access to services and utilities, including (where required) occupancy permits, operating certificates, and similar releases.

7. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

8. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner.

9. Make final change-over of locks and transmit keys to Owner, and advise Owner's personnel of change-over in security provisions.

10. Complete start-up testing of systems, and instructions of Owner's operating/maintenance personnel. Discontinue (or change over) and remove from project site temporary facilities and services, along with construction tools and facilities, mock-ups, and similar elements.

11. Complete final clean up requirements.

B. Inspection Procedures: Upon receipt of Contractor's written request, Architect/Engineer will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, Architect will either prepare certificate of substantial completion, or advise Contractor of work which must be performed prior to issuance of certificate; and repeat inspection when requested and assured that work has been substantially completed. Results of completed inspection will form "punchlist" for final acceptance. An additional inspection will be billed to the Owner and deducted from the Contractor's application for payment.

1.04 PREREQUISITES TO FINAL ACCEPTANCE

A. General: Request in writing Architect's final inspection for certification of final acceptance and final payment, as required by General Provisions, complete the following and list known exceptions (if any) in request: Provide in writing notification of day that work is complete and ready for final inspection.

1. Submit final payment request with final releases (including lien releases) and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit updated final statement, accounting for final changes to contract sum.

3. Submit initialled copy of Architect's final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.

4. Revise and submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: Upon receipt of Contractor's written notice that work has been completed, including punch list items resulting from earlier substantial completion inspection and excepting incomplete items delayed because of acceptable circumstances, Architect will reinspect work. Upon completion of final inspection, Architect will confirm final acceptance or advise Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, procedure will be repeated at contractor's expense after first reinspection.

1.05 RECORD DOCUMENT SUBMITTALS

A. General: General submittal requirements are indicated in "Submittals" sections. Do not use record documents for construction purposes; provide access to record documents for Architect's reference during normal working hours. Electronic or CADD record documents must be in the same size and format as the contract documents.

B. Record Drawings: Maintain a white-print set (blue-line or black-line) of contract drawings and shop drawings in clean, undamaged condition, with mark-up of actual installations. Mark with red erasable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work. Mark up new information which is recognized to be of importance to Owner. Give particular attention to concealed work, which would be difficult to measure and record at a later date.

C. Record Specifications: Maintain one copy of specifications, including addenda, change orders and similar modifications issued in printed form during construction, and mark up variations (of

substance) in actual work. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed.

D. Miscellaneous Record Submittals: Immediately prior to date(s) of substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to Architect for Owner's records.

E. Maintenance Manuals: Organize maintenance-and-operating manual information, and bind into individual 3" three ring binders properly identified and indexed (thumb-tabbed) per each specification section. Include emergency instructions, spare parts listing, warranties, wiring diagrams, recommended "turn-around" cycles, inspection procedures, shop drawings, product data, and similar applicable information.

PART 2 - PRODUCTS (Not Applicable.)

PART 3 - EXECUTION

3.01 CLOSEOUT PROCEDURES

General Operating/Maintenance Instructions: Arrange for each installer of work requiring continuing maintenance or operation, to meet with Owner's personnel, at project site, to provide basic instructions needed for proper operation and maintenance of entire work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures.

3.02 FINAL CLEANING

A. General: General cleaning during progress of work is specified in General Conditions and as temporary services in "Temporary Facilities" section of this Division. Provide final cleaning of the work for a first-class building cleaning and maintenance program. Comply with manufacturer's instructions for cleaning operations.

B. See General Checklist at end of this section.

C. Removal of Protection: Except as otherwise indicated or requested by Architect, remove temporary protection devices and facilities which were installed during course of the work.

D. Compliances: Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at site, or bury debris or excess materials on Owner's property, or discharge volatile or other harmful or dangerous materials into drainage systems; remove waste materials from site and dispose of in a lawful manner.

Where extra materials of value remaining after completion of associated work have become Owner's property, dispose of these to Owner's best advantage as directed.

This is a general checklist of closeout items for this project. It is not all inclusive but a guide for reference.

PROJECT: Hail Damage Repair– Billings Parmly Library – Scrim & Skylight Replacement Rebid

LOCATION: 510 North Broadway, Billings, MT

DATE:

GENERAL:

MECHANICAL:

ELECTRICAL:

OTHER:

THOSE PRESENT:

Make sure work is done according to contract documents:

Contractor shall do the following special cleaning for all trades at completion of work:

(1) Remove stains from glass; wash, polish same, inside and outside. Exercise care not to scratch glass.
(2) Remove marks, stains, fingerprints, and other soil or dirt from painted, decorated, stained work.
(3) Clean and polish hardware for all trades, including removal of stains, dust, dirt, paint and the like.
(4) Remove spots, soil, and paint from all work.
(5) Clean fixtures, equipment; remove stains, paint, dirt and dust.
(6) Clean exterior metal surfaces, including doors, windows, required to have polished finish, of oil stains, dust, dirt, paint and the like; polish, and leave without fingermarks and other blemishes.

GENERAL:

(As applicable, verify compliance and correct the following)

____ 1. Removal of all construction materials.
____ 2. Check joints of materials - neat and clean, no smudges.
____ 3. Remove labels which are not required as permanent labels.
____ 4. Remove debris and surface residue from limited-access spaces including roofs, plenums, shafts, attics and similar spaces.
____ 5. Clean up: No rust/no chalk marks/no debris/no evidence of refuse, no equipment oil or grease.
____ 6. Clean all equipment.
____ 7. O & M Manuals.

EXTERIOR:

____ 1. Proper grading.
____ 2. No debris left on site.
____ 3. Sidewalks not chipped - new and existing.
____ 4. Everything sealed - joints of dissimilar materials.
____ 5. Secure all roof equipment.
____ 6. Remove all stains, foreign material from exterior of building.
____ 7. Look for other problems that might occur and correct.
____ 8. Clean project site (yard and grounds), including landscape development areas, of litter and foreign substances. Sweep paved areas to a broom-clean condition; remove stains, petrochemical spills and other foreign deposits.
____ 9. O & M Manuals and meeting.

END OF SECTION 01700

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01740 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to this section.

1.02 SUMMARY

This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

Refer to the General Conditions for terms of the Contractor's warranty of workmanship and materials. General closeout requirements are included in Section "Project Closeout."

Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions 2 through 16.

Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.03 DISCLAIMERS AND LIMITATIONS

Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.04 WARRANTY REQUIREMENTS

Related Damages and Losses: When correcting warranted Work that has failed, within three (3) days provide schedule to remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

Categories of Specific Warranties: Warranties on the work are in several categories, including those in the General Conditions and including but not necessarily limited to the following specific categories related to individual units of work:

1. Special Project Warranty (Guarantee): A warranty specifically written and signed by Contractor for a defined portion of the work; and, where required, countersigned by subcontractor, installer, manufacturer and other entity engaged by Contractor.

2. Specified Product Warranty: A warranty which is required by contract documents.

3. General Limitations: It is recognized that specific warranties are intended primarily to protect Owner against failure of the work to perform as required. Specific warranties do not cover failures in the work which result from: 1) Unusual and abnormal phenomena of the elements, 2) The Owner's misuse, maltreatment or improper maintenance of the work, 3) Vandalism after time of substantial completion, or 4) Insurrection or acts of aggression including war.

4. Related Damages and Losses: In connection with Contractor's correction of warranted work which has failed, remove and replace other work of project which has been damaged as a result of such failure.

5. Reinstatement of Warranty Period: Except as otherwise indicated, when work covered by a special project warranty or product warranty has failed, and been corrected, reinstate warranty by written endorsement.

    a. For a period of time equal to original warranty period of time.

6. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to a condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

7. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

8. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

9. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until entities required to countersign such commitments to do so.

1.05 SUBMITTALS

Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen days of substantial completion of that designated portion of the Work.

When a special warranty is required to be executed by the Contractor or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Architect for approval prior to final execution.

Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name, and the name of the Contractor.

When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

END OF SECTION 01740

DIVISION 2 – SITE CONSTRUCTION

DIVISION 2 - SITE CONSTRUCTION
SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to this section.

1.02 SUMMARY

A. This Section includes selective removal and subsequent offsite disposal.

B. Repair and replacement construction work and patching are included within the respective sections of specifications, including removal of materials for reuse and incorporation into remodeling or new construction.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Provisions of Contract and Division 1 Specification Sections.

A schedule indicating the proposed sequence of operations for selective demolition work provided to Owner's Representative for review prior to the start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.

Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

Coordinate with Owner's continuing occupation of portions of existing building and with Owner's partial occupancy of completed new work.

B. Photographs of existing condition of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Owner's Representative and Architect prior to start of work.

C. Permits & Bonds: Obtain permits and bonds (fiscal security) required by the agency having jurisdiction prior to mobilizing.

1.04 QUALITY CONTROL

A. Demolition Contractor Requirements:

1. Contractor to have five (5) years experience in similar work.
2. Contractor to provide three (3) references for work similar ($100,000 value minimum) to project scope.
3. Contractor is bonded as identified in the General Provisions.

1.05 JOB CONDITIONS

A. Occupancy: Owner will occupy the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of

Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect Owner's normal operations.

B. Conditions of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.

C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.

1. Storage or sale of removed items on site will not be permitted.

D. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.

1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.
2. Erect temporary covered passageways as required by authorities having jurisdiction.
3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse or structure or element to be demolished and adjacent facilities or work to remain.
4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
5. Protect entrances and floors with suitable coverings when necessary.
6. Construct temporary insulated coverings when necessary.
7. Construct temporary insulated dustproof partitions where required to separate areas where noisy extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
8. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occur to structure or interior areas of existing building.
9. Remove protections at completion of work.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.

F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with road, streets, walks, and other adjacent occupied or used facilities.

1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.

H. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
2. Maintain fire protection services during selective demolition operations.

I. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulation pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, operational disruption, mold, flooding and pollution.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 PREPARATION

A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.

1. Cease operations and notify Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
2. Cover and protect furniture, equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
3. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
    a. Where selective demolition occurs immediately adjacent to occupied portions of the building, install temporary vapor barrier enclosures or construct dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound-deadening insulation.
    b. Provide weather proof closure for exterior openings resulting from demolition work.
4. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
    a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.

3.02 DEMOLITION

A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

1. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
2. Provide services complying to E.P.A. standards, and air and water pollution controls, as required by local authorities having jurisdiction.
3. Stainless steel scrim material is to be recycled and the value applied to this project.

B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.02 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.

1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
2. Burning of removed materials is not permitted on project site.

3.03 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave areas broom clean.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02070

DIVISION 7 – THERMAL & MOISTURE PROTECTION

DIVISION 7 - THERMAL & MOISTURE PROTECTION
SECTION 07620 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract apply to work of this section.

1.02 SUMMARY:

A. The extent of each type of flashing and sheet metal work is indicated on the drawings and by provisions of this section.

B. The types of work specified in this section include the following:

Flashing and Sheet Metal
Cap Flashing:
  Prefinished Galvanized Cap Flashing
Reglet Flashing:
  Prefinished Galvanized Reglet Flashing
Roof / Wall Flashing:
  Galvanized Roof / Wall Flashing

C. Roofing accessories are specified in roofing system sections as roofing work.

1.03 SUBMITTALS:

A. Product Data: Flashing, Sheet Metal, Accessories: Submit manufacturer's product specifications, installation instructions and general recommendations for each specified sheet material and fabricated product.

1.04 JOB CONDITIONS:

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of the work and protection of materials and finishes.

PART 2 - PRODUCTS

2.01 FLASHING AND SHEET METAL MATERIALS:

A. Sheet Metal Flashing/Trim:

1. Steel zinc coated sheet ASTM A446 with G 90 zinc coating, 24 gage except as otherwise indicated. Baked on 20 year color to be selected from manufacturer's standard.

B. Miscellaneous Materials and Accessories:

1. Fasteners: Same metal as flashing/sheet metal or, other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
2. Bituminous Coating: FS TT-C0494 or SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
3. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
4. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed; comply with DOW 790.
5. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by manufacturer for exterior/interior nonmoving joints including riveted joints.
6. Adhesives: Type recommended by flashing sheet manufacturer for aterproof/weather-resistant seaming and adhesive application of flashing sheet.
7. Reglets: Metal units of the type and profile indicated, compatible with flashing indicated, noncorrosive. Similar to Frye Reglet: Type SM.
8. Metal Accessories: Provide sheet metal clips, starts, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.
9. Elastic Flashing Filler: Closed-cell polyethylene or other soft-closed-cell material recommended by elastic flashing manufacturer as filler under flashing loops to ensure movement with minimum stress on flashing sheet.
10. Roofing Cement: ASTM D-2822, asphaltic.

2.02 FABRICATED UNITS:

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels and indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seals with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproofed, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints) and provide joints covers extending 4" minimum each side of joint.

D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with industry standards and provide joint covers.

E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS:

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install metal flashing at all wall to roof intersections, roof penetrations and areas where sheathing would be exposed to the elements. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

B. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a course of paper slip sheet and a course of polyethylene underlayment.

C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

    1. Install counterflashing in reglets, either by snap-in seal arrangement, or by wedging in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

D. Install elastic flashing without stretching. Install elastic flashing filler strips to provide for movement by forming loops or bellows in width of flashing. Locate filler strips to facilitate complete drainage of water from flashing. Seam flashing sheets with adhesive, and anchor edges in manner indicated.

E. Nail flanges of expansion joint units to curb nailers, at maximum spacing of 6". Complete seams at joints between units, to form a continuous waterproof system.

3.02 CLEANING AND PROTECTION:

A. Clean exposed metal surfaces removing substances which might cause corrosion of metal or deterioration of finishes.

B. Protection: Installer shall advise contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION 07620

DIVISION 7 - THERMAL & MOISTURE PROTECTION
SECTION 07720 - ROOF ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract apply to work of this section.

1.02 SUMMARY

A. This section includes the following:

Roof Accessories:
Expansion Joints
Pipe Seal
Pipe Jack

Roof Drains:
Existing

1.03 SUBMITTALS

A. Product Data: Submit specifications, installation instructions, and general recommendations from siding manufacturer, including data that materials comply with requirements.

B. Samples: Full range of manufacturer's samples for color and texture selection, color/style/texture offered.

1.04 PRODUCT HANDLING

A. Store materials at site to prevent damage, elevating above ground on level blocking and covering to prevent water damage and to permit adequate ventilation within bundles.

1.05 JOB CONDITIONS

A. Substrate: Proceed with work only after substrate construction and penetrating work have been completed.

B. Weather Conditions: Proceed with work only when substrate is completely dry.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Expansion Joints:

1. Manville: Match existing.

B. Pipe seals: Match existing.

C. Pre-flashed pipe jack: Match existing.

2.02 MISCELLANEOUS MATERIALS

A. Sealants: Comply with requirements of Division 7 Section 07900 - Caulking and Sealants for materials required for siding work. Use only materials approved by siding manufacturers for compatibility with siding panels and installation.

2.03 MATERIALS GENERAL

A. Shop Finish, Rain Drainage: Provide manufacturer's standard baked-on acrylic shop finish on units (downspouts, and similar exposed units); 1.0 mil dry film thickness.

PART 3 - PROCEDURES

3.01INSTALLATION

A. Install as recommended by manufacturer. Verify installation requirements with roofing system.

B. Install as required by project conditions.

C. Conceal fasteners to greatest extent possible, by using heads prefinished to match siding at exposed locations.

    1. All edges to be painted if not covered by sealant.

D. Sealants: Seal joints as necessary for weather-tight, vermin-proof installation. Sealant: Match finish and color.

END OF SECTION 07720

DIVISION 7 - THERMAL & MOISTURE PROTECTION
SECTION 07900 - SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract apply to work of this section.

1.02 SUMMARY:

Sealants and Accessories
Butyl Sealant
Backer Rod
Silicone Sealant
Acrylic Sealant
Fire Caulk

PART 2 - PRODUCTS

2.01 MATERIALS:

Exterior Use:

A. Sealant: Dow #790, General Electric Silicone Sealant; Pecora BC-158 butyl, PTI 757 butyl, Sonneborn Butakauk; standard colors selected by Project Representative.

B. Joint Filler (7/8" maximum width):

1. Closed-cell foamed butyl or polyethylene rod: PRC "89" preformed joint filler, Dow "Ethafoam", PRC "Mincel" backer rods.
2. For joints exceeding 7/8" closed cell sponge of vinyl or rubber of medium density open celled sponge of vinyl or polyethylene tape bondbreaker on top.
3. Do not use asphalt saturated filler.

C. Primers: As recommended by manufacturer of sealant materials.

PART 3 - PROCEDURES

3.01 PREPARATION:

A. Prime joints both sides to full depth of sealant as required by manufacturer.

B. Fill large, deep joints with backing rod to proper depth for sealant shape.

C. Apply masking tape both sides of exposed joints.

3.02 INSTALLATION:

A. Apply sealant with gun or hand tool using nozzle of proper size for joints. Make beads at least 1/4" x 3/8" but not less that manufacturer's recommended sizes.

B. Point up exposed joints neatly by striking with tool or finger; do not allow ragged edges, runs, spatters.

C. Remove all masking tape. Clean sealant from adjacent surfaces.

END OF SECTION 07900

REFERENCE NATERIAL

O² ARCHITECTS

208 N. Broadway - Suite 350 Billings, Montana 59101 TEL (406) 259-7123 FAX (406) 256-7123 dono@o2architects.net

TRANSMITTAL LETTER

To: **Jackson Contractor Group**
Mike Chase

Date: 3/27/2013

CC: **WB+P**

Project Name: **Parmly Billings Library**

Project Number: **1101**

We transmit:

(x) Herewith
( ) In accordance with your request
( ) Under separate cover via:

For Your

( )	Approval	( )	Information	(X)	Distribution to Others
( )	Review & Comment	( )	Record	( )	_____

The following:

( )	Drawings	(X)	Shop Drawings	(x)	See Below
( )	Specifications	(X)	Product Literature	( )	Digital Files

Copies	Date:	Description:		
1	1/21/2013	05 7000	Metal SS Scrim	**Approved**

Remarks

Jackson
CONTRACTOR GROUP, INC.
P.O. Box 967, Missoula, MT 59806
406-542-9150 | FAX 542-3515

Submittal Packages

Summary with Register Items & Stamp

Parmly Billings Library
510 N. Broadway
Billings, MT 59101

Project # 2012.35

Jackson Contractor Group Inc.
Tel: 406-542-9150 Fax: 406-542-3515

Item No	Register No	Rev	Spec Section	Sub Section	Description	Responsible	Supplier	Rec'd On	Action
0070 - 05 7000 - 0			**Ornamental Metalwork - Scrim Channels w/ LEED**						
1	00073	0	05 70 00	1.03.A	Ornament. Mtlwork - Drawings	Rollfab Metal Products, LLC	Rollfab Metal Products, LLC	1/16/2013	Submitted
2	00074	0	05 70 00	1.03.B	Ornament. Mtlwork - Prod. Data	Rollfab Metal Products, LLC	Rollfab Metal Products, LLC	1/16/2013	Submitted
3	00075	0	05 70 00	1.03.C	Ornament. Mtlwork - Samples	Rollfab Metal Products, LLC	Rollfab Metal Products, LLC	1/16/2013	Submitted

SUBMITTAL REVIEW

✓ REVIEWED, NO EXCEPTIONS TAKEN __REVISE AND RESUBMIT
__NOTE COMMENTS __SEE ATTACHED COMMENTS

Corrections or comments made to the shop drawings during this review do not relieve subcontractor/vendor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The subcontractor/vendor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of all other trades, and performing his work in a safe and satisfactory manner.

JACKSON CONTRACTOR GROUP, INC.

BY MIKE CHASE DATE 1.21.13

A/E - is there a desired pattern for fasteners?

SHOP DRAWING | SUBMITTAL REVIEW

☒ APPROVED ☐ APPROVED WITH CHANGES NOTED
☐ REVISE & RESUBMIT ☐ REJECTED _____

SUBMITTAL WAS REVIEWED FOR DESIGN CONFORMITY AND GENERAL CONFORMANCE TO CONTRACT DOCUMENTS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING DIMENSIONS AT JOB SITES FOR TOLERANCES, CLEARANCES, QUANTITIES, FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATION OF THE WORK WITH OTHER TRADES AND FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS.

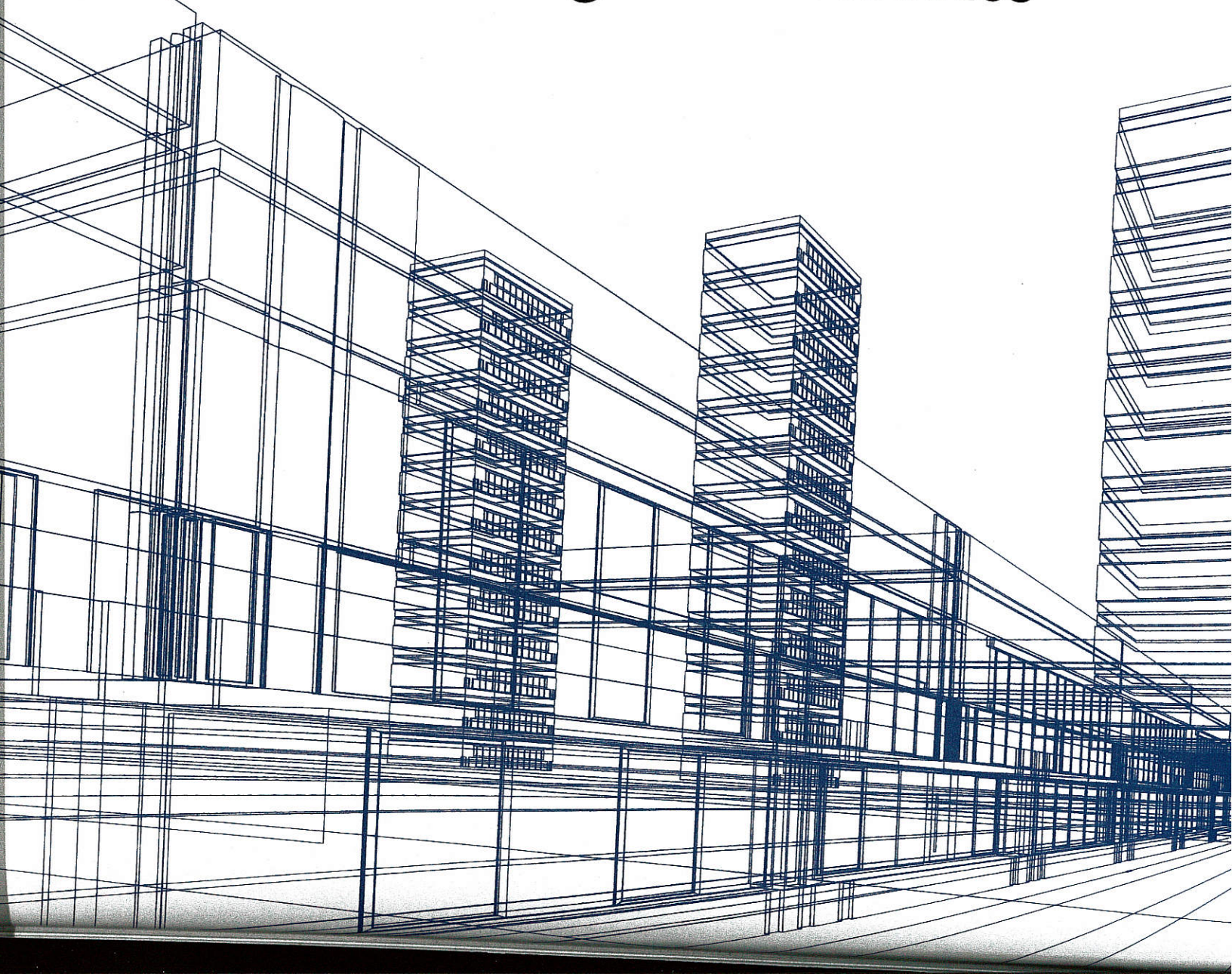
will bruder architects *kent mcclure 03.26.13*
4200 North Central Avenue Phoenix, Arizona 85012 **602.277.5211** f 602.277.5202

RMP

ROLLFAB

METAL PRODUCTS

Architectural & Structural Metal Roofing, Siding & Accessories



MANUFACTURER'S QUALIFICATION STATEMENT

Rollfab Metal Products was established in 1997 by George Shafer, a veteran manufacturer of prefinished metal roofing and siding in the industry since 1986.

The combined staff of Rollfab has over 50 years of experience in sheet metal fabrication.

Rollfab offers a large selection of architectural metal roofing, metal siding, and custom flashing products for usage on commercial, industrial, and residential projects. These can be provided in various metal types, textures, gauges, finishes, and colors.

Rollfab's 32,000 SF facility located in the heart of Phoenix features "State of the Art" computer controlled manufacturing equipment to achieve the highest quality and consistency for large and small orders. The facility's layout is engineered to minimize the handling of the material and maximize the productive efficiency of the work force. This allows them to produce over a million square feet of product annually.

Rollfab's standing seam roof product offerings are produced on portable roll-forming equipment. This service allows you the design flexibility and construction practicality of having Rollfab "Jobsite Roll-form" panels in excess of shippable lengths. This provides continuous "eave to ridge", or "eave to eave in the case of barrel vault roofs", panel lengths; thus eliminating the need for problematic panel end laps.

Rollfab's technical staff is always ready, available, and willing to render assistance to you in the design, selection, and application of the products you're considering using.

Projects of similar size and complexity to Dine College Archival Building:

Chandler Performing Arts Center, Chandler, AZ
Franciscan Winery in Napa Valley, CA
U of A Student Housing Center in Tucson
Fountain Hills Elementary School, Fountain Hills, AZ
NAU Business Administration Bldg., Flagstaff, AZ
Phoenix Fire Station #16, Phoenix, AZ
Arizona Bank & Trust, Phoenix, AZ
Cocopah Casino in Yuma, AZ
Showlow Junior High School, Showlow, AZ
Sanctuary on Camelback, Phoenix, AZ
The Vale, Tempe, AZ
Sells Recreation Facility, Sells, AZ
U.S. Bank @ Desert Ridge, Phoenix, AZ
Arizona Bank & Trust Chandler, AZ
Command and Control Facility Headquarter Fort Bliss, El Paso, TX
Apache Junction Magistrate Facility, Apache Junction, AZ
Paradise Valley Country Club, Paradise Valley, AZ

Contact: Steven Tetreault
Rollfab Metal Building Products
602-275-1676

Steven Tetreault
Rollfab Metal Building Products
602-275-1676

CHOOSING AND USING "DESIGNER" METAL ROOFING PANELS

By Steven Tetreault*

Picture these scenarios: A commercial client calls to tell you that he wants the look of a copper verdigris roof for a new project… but his budget can't handle the high cost of copper. Another client calls looking for an unusual profile that you can't find in the standard product lines offered by your panel manufacturing sources. Or, a client asks if you can order and install an S-shaped canopy made of curved metal panels.

Would you know how to advise your customers in these situations? The fact is, in recent years, the metal roofing market has grown quite sophisticated, with many more choices available to contractors, architects and building owners. This article will attempt to update you on some of the latest trends in metal roofing, focusing especially on specialty or "designer" panels. The purpose will be to familiarize you with some of the new types of products now available and the processes that make them possible… so that you'll be able to answer the above questions, and more.

In past decades, metal roofing panels were used primarily on metal buildings and rural structures. Though highly functional and low in cost, these panels (mostly corrugated profiles) perpetuated the belief that metal roofing was a low-end product reserved for industrial and agricultural projects.

Today's "designer" panels are a whole different story. Because of their excellent aesthetics, these panels are ideal for commercial and residential applications where corrugated roofing would not have been an option. The result: Your clients can enjoy the high performance and life cycle cost benefits of metal with no compromise in aesthetics.

Fabricating Techniques

Most roofing panels are fabricated using **roll forming** equipment. In this process, sheet metal coil is fed through a machine where it passes under a series of precision rollers that determine the shape of the profile. Every profile requires a different series of rollers; so if a customer wanted to deviate from a standard profile, the cost would usually be prohibitive.

Press forming machinery uses top and bottom dies that stamp the sheet metal coil into the desired profile. A system of programmable stops allows the operator to produce the desired angle bend. Using press forming, many different shapes can be made with a single die by simply adjusting the stops. This technique results in greater design flexibility with no need to change tooling.

Advanced **finishing** techniques have also contributed to the growth of designer panels. Today's standard paint coatings offer low maintenance, excellent durability, and a wide palette of colors. In addition, new techniques have made it possible to achieve special design effects. For example, two-toned paint patterns have a "marbled" appearance that lends a richer, more textured look than a standard paint finish for high-end projects. A two-toned pattern is used on the celebrated new Bellagio hotel in Las Vegas, where it simulates the look of copper verdigris using much less costly galvanized steel. The pattern was first created as a painting, which was later replicated with computer imaging techniques and transferred to the machine that would cut the roll. The coil coater then manipulated the pattern on-line until they achieved the desired texture and finish characteristics. Without advanced technologies, printed patterns like this would not be viable.

Metal curving techniques have become popular for creating attractively curved roofs, mansards, fascias, canopies and more. Probably the most versatile technique is **crimp-curving**, which was introduced to this country in the mid-1980s. Crimp-curving may be used to shape panels into virtually any radius or angle without marring the panel finish, and it is suited to a wide range of profiles from ¾" to 4" deep in 18-26 GA metal. Crimp-curving can actually double the load factor of steel panels. Crimp-curving creates lightweight yet rigid components that require minimal structural support. The technique may also be used to produce mitered corners and multiple-radius curves – including the "S-shaped" canopy mentioned at the beginning of this story.

Stretch-forming is another curving technique that is used on a more limited basis. The stretch-forming equipment pulls the panel around a custom jig or form and stretches it into shape. It provides an alternative in situations where crimp-curving is not viable – for example, when there is a need to bend very deep-ribbed panels. Unlike crimp-curving, the stretching process will decrease the strength of the metal, so a heavier substrate (18-20 GA) is required.

Choosing a Standard Profile

Due to all these advances, for most projects you need look no further than the standard product offerings of today's metal component manufacturers. Before you order a custom panel, check out the following "standard" specialty metal roofing panels:

- Extra-deep profiles (panels with a depth of more than three inches) may be selected to create interesting architectural relief effects. Deep-ribbed panels are particularly suited to large-scale industrial or commercial jobs, where their high strength and long-span capabilities make it possible to reduce structural costs. The deep panel ribs are highly aesthetic and may be varied to create different light and shadow effects.

One project recently used a pan and batten roofing system with panel depth of 11 inches! The result was dramatic, to say the least.

- Exposed fastener panels that simulate the look of more costly concealed fastener systems are also available. Their vertical ribs mimic the look of standing seam or batten seam roofing, while simplifying installation and saving money.

- Special modifications can be made to standard panels with no need for special tooling, using press forming machinery as described above. For example, the manufacturer can vary the width of the reveal and/or the top pan to the specified dimensional requirements, creating shadow lines in almost any location on the panel surface. Profiles may be symmetrical or asymmetrical, and ribs may be fabricated in virtually any angle desired. This high degree of flexibility offers greater freedom and control in new construction projects. It can also allow you to reconstruct difficult-to-match panels for retrofit or renovation jobs.

- Tile facsimile panels are designed to combine the high performance of metal with the popular look of clay tile, at just a fraction of the weight. They can therefore be used for residential and commercial projects where tile appearance is desired but weight is a concern. For best performance, look for a system with long-length panels that install vertically from eave to ridge and are secured with screw fasteners. A system with this design will typically offer the fastest installation and greatest wind resistance. Similar products are also available to simulate the look of shingles or shakes.

- Duotone and other high-tech paint finishes can sometimes be used to mimic the look of more expensive substrates or to give panels a textured appearance, as noted earlier.

Going Custom

After all is said and done, if you still decide to go the custom route, be sure to allow ample lead time for design and fabrication of your special panels. Here are some specific considerations to keep in mind:

- How much material will be needed? Most panels are made from coil stock in modules 36", 42" or 48" wide. Panels should be planned with these modules in mind to minimize costly "drop" or waste (the amount of unused coil that will have to be scrapped). The amount of material required by the panel will also affect cost. A deep profile with heavy ribbing will use more metal per square foot than a shallow, flush-faced panel.

- What substrate will be used? The industry standards – galvanized or zinc aluminum coated steel – are the most economical choices, while special materials such as stainless steel or copper will carry a cost premium.

- How complex is the panel design? This may affect cost in other areas, too. A modified panel produced with an existing die will cost less than one requiring special

tooling. A complex design with multiple ribs and angles may be more time-consuming to fabricate than a simpler profile.

- What type of finish will be best? Review the requirements of the project, including climate and environmental conditions, usage, roof slope, etc. Can a standard color be used? Special colors involve a longer lead time (typically 4-8 weeks) and will usually carry minimum order requirements. Should a protective film be applied to protect panels during installation?

- What other fabrication processes will be required? For example, crimp-curving of panels will carry an additional service charge. However, for many applications – such as self-supporting covers or roof decks – the curved panels can actually save money in labor and materials by reducing the amount of structural support needed and allowing you to use a lighter gauge of metal.

- What about code considerations? If the panel is to be used structurally, it must meet load-bearing requirements. If an UL-90 rated panel is modified in any way, its rating will be invalidated. If panels are to be installed over a wood deck, fire codes may be a concern, so check first. Span requirements are generally not a problem.

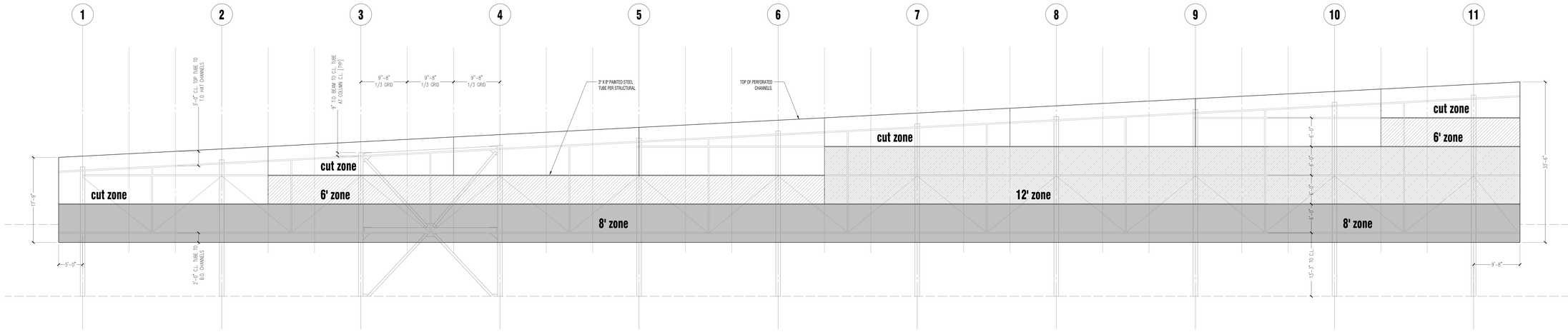
- What are the panel manufacturer's capabilities? When sourcing custom panels, inquire about the supplier's expertise in this area. Be sure to ask:

  -What types of materials, paint finishes and colors are offered?
  -What are the limitations on panel depths, widths and lengths?
  -What tooling is currently available?
  -Is engineering support available (including calculations and shop drawings)?
  -For curved panels, what type of curving process is used? Again, is technical support available for these applications?

Specialty or "designer" metal panels are not for every application. But it's a good idea to keep informed of the latest developments and understand how to choose and use these new profiles – whether standard or customized. By doing so, you have an opportunity to expand your product base; make inroads into the profitable high end market, and differentiate yourself from competitors.

# # #

Steven Tetreault is general sales manager for Rollfab Metal Products, Phoenix, AZ., a manufacturer of metal roofing panels. The author can be reached at (602) 275-1676; email info@rollfabmetal.com; website at www.rollfabmetal.com



sheet notes

- A. SEE PLAN SHEET A2.2, AND ELEVATION SHEETS A3.1 AND A3.2 FOR VISUAL REPRESENTATION OF SCRIM RHYTHM / SCALE ACROSS ENTIRE ELEVATION.
- B. SHADE SCRIM IS COMPRISED OF CUSTOM HAT CHANNEL PROFILES IN 20 GA. STAINLESS STEEL SHEET METAL. SEE PROFILES IN DRAWING 4 BELOW.
- C. ALL PROFILES BEGIN AS FLAT SHEET SHEET STRIPS, IN MODULES SHEARED OUT OF STANDARD 4' WIDE SHEET. ORIGINATING WIDTHS ARE 24", 12" & 18".
- D. ELEVATION DRAWING DEPICTS ZONES OF HAT CHANNEL HEIGHT. HATCHED AREAS INDICATE ZONES OF TYPICAL HEIGHTS, AS NOTED ON ELEVATION AND IN HAT CHANNEL INVENTORY. NON HATCHED AREAS ARE THOSE ENGAGED WITH THE SLOPING TOP PROFILE OF SCRIM, AND MUST BE TRIMMED TO FIT. TRIM HEIGHTS ARE LISTED IN THE SCHEDULED INVENTORY FOR EACH HAT ACROSS ENTIRE ELEVATION. PANELS SHALL BE TRIMMED TO HEIGHT WHEN FLAT, THEN FORMED TO HAT PROFILE. TOP OF HAT CHANNEL IS TO BE LEVEL, NOT SLOPED. [TOPS OF INSTALLED HAT CHANNELS WILL STEP SLIGHTLY].
- E. HAT CHANNELS INSTALL TO FACE OF 3" X 8" TUBE STEEL HORIZONTALS. FASTENING IS BY POWDER ACTUATED NAILS. ARCHITECT TO APPROVE APPEARANCE / SPACING, ETC. IN MOCK-UP.
- F. HAT CHANNEL INVENTORY GIVES ORDER OF HAT PROFILES ACROSS ELEVATION. GAPS BETWEEN EACH INSTALLED HAT ARE GIVEN IN FRACTIONAL INCHES. AS MUCH AS POSSIBLE, THE GAPS SHOWN IN THE SCHEDULE SHOULD BE MAINTAINED, THOUGH SOME GAPS MAY REQUIRE ADJUSTMENT TO FIT HATS WITHIN 1/3 GRID MODULES. 1/3 GRIDS ARE GIVEN AS CHECK POINTS FOR INSTALLATION, TO INSURE THE COUNT WILL FIT, AND PREVENT THE ORDER FROM "SLIDING" ACROSS THE ENTIRE ELEVATION.
- G. SOUTH ELEVATION SHOWN. NORTH ELEVATION IS TO BE MIRROR IMAGE, AND USE THE SAME ORDER / SPACING GIVEN IN THE INVENTORY. SO ALL QUANTITIES DERIVED FROM INVENTORY SHOULD BE MULTIPLIED X 2.
- H. GAP AT ABUTTING ENDS IS TO BE DETERMINED. ARCHITECT TO STUDY VISUAL IMPACT OF GAP SIZES AND ADVISE / APPROVE IN FIELD.
- I. THE LAST HAT CHANNEL AT EACH END SHOULD HAVE OUTER EDGE OF 1" RETURN FLANGE ALIGNED WITH END OF HORIZONTAL SUPPORT TUBES.

1 hat height legend

2 hat channel inventory

20 GA PERFORATED STAINLESS STEEL SHEET
1/8" DIAMETER HOLE
1/4" STAGGERED CENTERS
22.7% OPEN

4 perforated pattern

PROFILE B FORMED FROM 2'-0" WIDE SHEET

PROFILE C FORMED FROM 1'-6" WIDE SHEET

PROFILE A FORMED FROM 1'-0" WIDE SHEET

3 hat channel profiles

a3.4

hat channel scrim layout

scale varies

parmly billings library

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Phoenix, Arizona 85008
602 324 6000
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WILLIAM P. BRUDER
3278
PHOENIX, AZ

10132

construction documents

30 March 2012

01 May 2012
Bid Package Development 1

30 May 2012
City of Billings Comments 2

25 July 2012
Final Bid Package 3

ROLLFAB PERFORATED HAT CHANNEL "A" CUT LIST

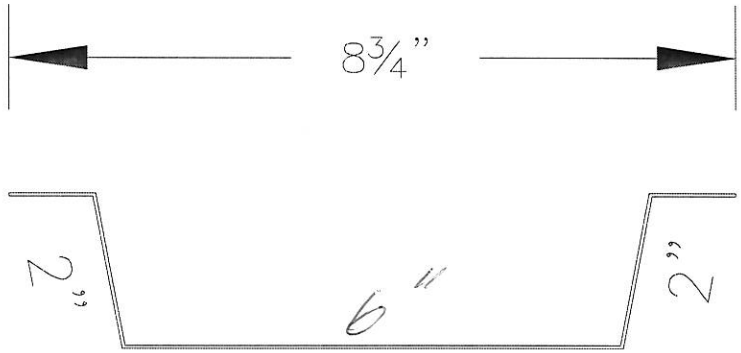
JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

MATERIAL DATA	
GAUGE	20

INPUT PANEL DATA	
O.C. SPACING	8.7500
STRETCH OUT	



QUANTITY	LENGTH FEET	LENGTH INCHES	LENGTH (INCHES)	PROFILE SHAPE	GRID NO.	COMMENTS	LINEAL FEET	NET SQ. FT.	WEIGHT	COMPLETED BY:
324	**8 ft**	**0. in**	96.000	**A**			2592.00	1890.00	0.00	
154	**6 ft**	**0. in**	72.000	**A**			924.00	673.75	0.00	
154	**12 ft**	**0. in**	144.000	**A**			1848.00	1347.50	0.00	
2	**10 ft**	**0.313 in**	120.313	**A**			20.05	14.62	0.00	
2	**10 ft**	**0.75 in**	120.750	**A**			20.13	14.67	0.00	
2	**10 ft**	**2.375 in**	122.375	**A**			20.40	14.87	0.00	
2	**10 ft**	**4.875 in**	124.875	**A**			20.81	15.18	0.00	
2	**10 ft**	**5.375 in**	125.375	**A**			20.90	15.24	0.00	
2	**10 ft**	**5.813 in**	125.813	**A**			20.97	15.29	0.00	
2	**10 ft**	**7.125 in**	127.125	**A**			21.19	15.45	0.00	
2	**10 ft**	**7.563 in**	127.563	**A**			21.26	15.50	0.00	
2	**10 ft**	**8.875 in**	128.875	**A**			21.48	15.66	0.00	
2	**10 ft**	**10.188 in**	130.188	**A**			21.70	15.82	0.00	
2	**10 ft**	**11.813 in**	131.813	**A**			21.97	16.02	0.00	
2	**11 ft**	**1.125 in**	133.125	**A**			22.19	16.18	0.00	
2	**11 ft**	**1.563 in**	133.563	**A**			22.26	16.23	0.00	
2	**11 ft**	**2.875 in**	134.875	**A**			22.48	16.39	0.00	
2	**11 ft**	**4.188 in**	136.188	**A**			22.70	16.55	0.00	
2	**11 ft**	**5.813 in**	137.813	**A**			22.97	16.75	0.00	
2	**11 ft**	**7.438 in**	139.438	**A**			23.24	16.95	0.00	

ROLLFAB PERFORATED HAT CHANNEL "A" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**11 ft**	**9.375 in**	141.375	**A**			23.56	17.18	0.00	
2	**11 ft**	**11.375 in**	143.375	**A**			23.90	17.42	0.00	
2	**11 ft**	**11.813 in**	143.813	**A**			23.97	17.48	0.00	
2	**6 ft**	**0.313 in**	72.313	**A**			12.05	8.79	0.00	
2	**6 ft**	**0.75 in**	72.750	**A**			12.13	8.84	0.00	
2	**6 ft**	**2.375 in**	74.375	**A**			12.40	9.04	0.00	
2	**6 ft**	**4.875 in**	76.875	**A**			12.81	9.34	0.00	
2	**6 ft**	**5.375 in**	77.375	**A**			12.90	9.40	0.00	
2	**6 ft**	**5.813 in**	77.813	**A**			12.97	9.46	0.00	
2	**6 ft**	**7.125 in**	79.125	**A**			13.19	9.62	0.00	
2	**6 ft**	**7.563 in**	79.563	**A**			13.26	9.67	0.00	
2	**6 ft**	**8.875 in**	80.875	**A**			13.48	9.83	0.00	
2	**6 ft**	**10.188 in**	82.188	**A**			13.70	9.99	0.00	
2	**6 ft**	**11.813 in**	83.813	**A**			13.97	10.19	0.00	
2	**7 ft**	**0.313 in**	84.313	**A**			14.05	10.25	0.00	
2	**7 ft**	**1.938 in**	85.938	**A**			14.32	10.44	0.00	
2	**7 ft**	**3.25 in**	87.250	**A**			14.54	10.60	0.00	
2	**7 ft**	**4.5 in**	88.500	**A**			14.75	10.76	0.00	
2	**7 ft**	**5. in**	89.000	**A**			14.83	10.82	0.00	
2	**10 ft**	**1.125 in**	121.125	**A**			20.19	14.72	0.00	
2	**10 ft**	**1.563 in**	121.563	**A**			20.26	14.77	0.00	
2	**10 ft**	**2.875 in**	122.875	**A**			20.48	14.93	0.00	
2	**10 ft**	**4.188 in**	124.188	**A**			20.70	15.09	0.00	
2	**10 ft**	**5.813 in**	125.813	**A**			20.97	15.29	0.00	
2	**10 ft**	**6.25 in**	126.250	**A**			21.04	15.34	0.00	
2	**10 ft**	**6.75 in**	126.750	**A**			21.13	15.40	0.00	
2	**10 ft**	**7.25 in**	127.250	**A**			21.21	15.46	0.00	
2	**10 ft**	**9.688 in**	129.688	**A**			21.61	15.76	0.00	
2	**10 ft**	**11.375 in**	131.375	**A**			21.90	15.97	0.00	
2	**10 ft**	**11.813 in**	131.813	**A**			21.97	16.02	0.00	
2	**11 ft**	**0.313 in**	132.313	**A**			22.05	16.08	0.00	
2	**11 ft**	**1.938 in**	133.938	**A**			22.32	16.28	0.00	

ROLLFAB PERFORATED HAT CHANNEL "A" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**11 ft**	**3.25 in**	135.250	**A**			22.54	16.44	0.00	
2	**11 ft**	**4.5 in**	136.500	**A**			22.75	16.59	0.00	
2	**11 ft**	**5. in**	137.000	**A**			22.83	16.65	0.00	
2	**11 ft**	**7.125 in**	139.125	**A**			23.19	16.91	0.00	
2	**11 ft**	**7.563 in**	139.563	**A**			23.26	16.96	0.00	
2	**11 ft**	**8.875 in**	140.875	**A**			23.48	17.12	0.00	
2	**11 ft**	**10.188 in**	142.188	**A**			23.70	17.28	0.00	
2	**11 ft**	**11.813 in**	143.813	**A**			23.97	17.48	0.00	
2	**6 ft**	**0.313 in**	72.313	**A**			12.05	8.79	0.00	
2	**6 ft**	**0.75 in**	72.750	**A**			12.13	8.84	0.00	
2	**6 ft**	**2.375 in**	74.375	**A**			12.40	9.04	0.00	
2	**6 ft**	**4.875 in**	76.875	**A**			12.81	9.34	0.00	
2	**6 ft**	**5.375 in**	77.375	**A**			12.90	9.40	0.00	
2	**6 ft**	**5.813 in**	77.813	**A**			12.97	9.46	0.00	
2	**6 ft**	**7.125 in**	79.125	**A**			13.19	9.62	0.00	
2	**6 ft**	**7.563 in**	79.563	**A**			13.26	9.67	0.00	
2	**6 ft**	**8.875 in**	80.875	**A**			13.48	9.83	0.00	
2	**6 ft**	**10.188 in**	82.188	**A**			13.70	9.99	0.00	
2	**6 ft**	**11.813 in**	83.813	**A**			13.97	10.19	0.00	
2	**7 ft**	**0.313 in**	84.313	**A**			14.05	10.25	0.00	
2	**7 ft**	**0.75 in**	84.750	**A**			14.13	10.30	0.00	
2	**7 ft**	**1.25 in**	85.250	**A**			14.21	10.36	0.00	
2	**7 ft**	**3.688 in**	87.688	**A**			14.61	10.66	0.00	
2	**7 ft**	**5.375 in**	89.375	**A**			14.90	10.86	0.00	
2	**7 ft**	**5.813 in**	89.813	**A**			14.97	10.91	0.00	
2	**7 ft**	**7.438 in**	91.438	**A**			15.24	11.11	0.00	
2	**7 ft**	**9.375 in**	93.375	**A**			15.56	11.35	0.00	
2	**7 ft**	**11.375 in**	95.375	**A**			15.90	11.59	0.00	
2	**7 ft**	**11.813 in**	95.813	**A**			15.97	11.64	0.00	
2	**8 ft**	**0.313 in**	96.313	**A**			16.05	11.70	0.00	
2	**8 ft**	**0.75 in**	96.750	**A**			16.13	11.76	0.00	
2	**8 ft**	**2.375 in**	98.375	**A**			16.40	11.96	0.00	

ROLLFAB PERFORATED HAT CHANNEL "A" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**8 ft**	**4.875 in**	100.875	**A**			16.81	12.26	0.00	
2	**8 ft**	**5.375 in**	101.375	**A**			16.90	12.32	0.00	
2	**8 ft**	**5.813 in**	101.813	**A**			16.97	12.37	0.00	
2	**8 ft**	**7.438 in**	103.438	**A**			17.24	12.57	0.00	
2	**8 ft**	**9.375 in**	105.375	**A**			17.56	12.81	0.00	
2	**8 ft**	**11.375 in**	107.375	**A**			17.90	13.05	0.00	
2	**8 ft**	**11.813 in**	107.813	**A**			17.97	13.10	0.00	
2	**9 ft**	**1.125 in**	109.125	**A**			18.19	13.26	0.00	
2	**9 ft**	**1.563 in**	109.563	**A**			18.26	13.31	0.00	
2	**9 ft**	**2.875 in**	110.875	**A**			18.48	13.47	0.00	
2	**9 ft**	**4.188 in**	112.188	**A**			18.70	13.63	0.00	
2	**9 ft**	**5.813 in**	113.813	**A**			18.97	13.83	0.00	
2	**9 ft**	**7.125 in**	115.125	**A**			19.19	13.99	0.00	
2	**9 ft**	**7.563 in**	115.563	**A**			19.26	14.04	0.00	
2	**9 ft**	**8.25 in**	116.250	**A**			19.38	14.13	0.00	
2	**9 ft**	**10.188 in**	118.188	**A**			19.70	14.36	0.00	
2	**9 ft**	**11.813 in**	119.813	**A**			19.97	14.56	0.00	
2	**9 ft**	**9.188 in**	117.188	**A**			19.53	14.24	0.00	
2	**9 ft**	**10.5 in**	118.500	**A**			19.75	14.40	0.00	
2	**9 ft**	**11. in**	119.000	**A**			19.83	14.46	0.00	
2	**10 ft**	**0.313 in**	120.313	**A**			20.05	14.62	0.00	
2	**10 ft**	**1.938 in**	121.938	**A**			20.32	14.82	0.00	
2	**10 ft**	**3.25 in**	123.250	**A**			20.54	14.98	0.00	
2	**10 ft**	**4.5 in**	124.500	**A**			20.75	15.13	0.00	
2	**10 ft**	**5. in**	125.000	**A**			20.83	15.19	0.00	
2	**10 ft**	**7.125 in**	127.125	**A**			21.19	15.45	0.00	
2	**10 ft**	**7.563 in**	127.563	**A**			21.26	15.50	0.00	
2	**10 ft**	**8.875 in**	128.875	**A**			21.48	15.66	0.00	
2	**10 ft**	**10.188 in**	130.188	**A**			21.70	15.82	0.00	
2	**10 ft**	**11.813 in**	131.813	**A**			21.97	16.02	0.00	
2	**11 ft**	**0.313 in**	132.313	**A**			22.05	16.08	0.00	
2	**11 ft**	**1.938 in**	133.938	**A**			22.32	16.28	0.00	

ROLLFAB PERFORATED HAT CHANNEL "A" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**11 ft**	**3.25 in**	135.250	**A**			22.54	16.44	0.00	
2	**11 ft**	**4.5 in**	136.500	**A**			22.75	16.59	0.00	
2	**11 ft**	**5. in**	137.000	**A**			22.83	16.65	0.00	
2	**11 ft**	**6.313 in**	138.313	**A**			23.05	16.81	0.00	
2	**11 ft**	**6.75 in**	138.750	**A**			23.13	16.86	0.00	
2	**11 ft**	**8.375 in**	140.375	**A**			23.40	17.06	0.00	
2	**11 ft**	**10.875 in**	142.875	**A**			23.81	17.36	0.00	
2	**11 ft**	**11.375 in**	143.375	**A**			23.90	17.42	0.00	
2	**11 ft**	**11.813 in**	143.813	**A**			23.97	17.48	0.00	
2	**6 ft**	**1.063 in**	73.063	**A**			12.18	8.88	0.00	
2	**6 ft**	**1.563 in**	73.563	**A**			12.26	8.94	0.00	
2	**6 ft**	**2.875 in**	74.875	**A**			12.48	9.10	0.00	
2	**6 ft**	**4.125 in**	76.125	**A**			12.69	9.25	0.00	
2	**6 ft**	**5.813 in**	77.813	**A**			12.97	9.46	0.00	
2	**6 ft**	**7.438 in**	79.438	**A**			13.24	9.65	0.00	
2	**6 ft**	**9.375 in**	81.375	**A**			13.56	9.89	0.00	
2	**6 ft**	**11.313 in**	83.313	**A**			13.89	10.12	0.00	
2	**6 ft**	**11.813 in**	83.813	**A**			13.97	10.19	0.00	
2	**7 ft**	**1.063 in**	85.063	**A**			14.18	10.34	0.00	
2	**7 ft**	**1.563 in**	85.563	**A**			14.26	10.40	0.00	
2	**7 ft**	**2.875 in**	86.875	**A**			14.48	10.56	0.00	
2	**7 ft**	**4.125 in**	88.125	**A**			14.69	10.71	0.00	
2	**7 ft**	**5.813 in**	89.813	**A**			14.97	10.91	0.00	
2	**7 ft**	**7.063 in**	91.063	**A**			15.18	11.07	0.00	
2	**7 ft**	**7.563 in**	91.563	**A**			15.26	11.13	0.00	
2	**7 ft**	**8.875 in**	92.875	**A**			15.48	11.29	0.00	
2	**7 ft**	**10.125 in**	94.125	**A**			15.69	11.44	0.00	
2	**7 ft**	**11.813 in**	95.813	**A**			15.97	11.64	0.00	
2	**8 ft**	**0.25 in**	96.250	**A**			16.04	11.70	0.00	
2	**8 ft**	**1.938 in**	97.938	**A**			16.32	11.90	0.00	
2	**8 ft**	**3.188 in**	99.188	**A**			16.53	12.05	0.00	
2	**8 ft**	**4.5 in**	100.500	**A**			16.75	12.21	0.00	

ROLLFAB PERFORATED HAT CHANNEL "A" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**8 ft**	**5. in**	101.000	**A**			16.83	12.27	0.00	
2	**8 ft**	**6.25 in**	102.250	**A**			17.04	12.43	0.00	
2	**8 ft**	**7.938 in**	103.938	**A**			17.32	12.63	0.00	
2	**8 ft**	**9.188 in**	105.188	**A**			17.53	12.78	0.00	
2	**8 ft**	**10.5 in**	106.500	**A**			17.75	12.94	0.00	
2	**8 ft**	**11. in**	107.000	**A**			17.83	13.00	0.00	
2	**9 ft**	**0.25 in**	108.250	**A**			18.04	13.16	0.00	
2	**9 ft**	**0.75 in**	108.750	**A**			18.13	13.22	0.00	
2	**9 ft**	**1.188 in**	109.188	**A**			18.20	13.27	0.00	
2	**9 ft**	**3.688 in**	111.688	**A**			18.61	13.57	0.00	
2	**9 ft**	**5.313 in**	113.313	**A**			18.89	13.77	0.00	
2	**9 ft**	**5.813 in**	113.813	**A**			18.97	13.83	0.00	
2	**9 ft**	**7.125 in**	115.125	**A**			19.19	13.99	0.00	
2	**9 ft**	**7.563 in**	115.563	**A**			19.26	14.04	0.00	
2	**9 ft**	**8.875 in**	116.875	**A**			19.48	14.20	0.00	
2	**9 ft**	**10.125 in**	118.125	**A**			19.69	14.36	0.00	
2	**9 ft**	**11.813 in**	119.813	**A**			19.97	14.56	0.00	
956							**8300.07**	**6052.14**	**0.00**	

NOTE: LENGTHS ARE TO BE IN 1/8" MINIMUM INCREMENTS

ROLLFAB PERFORATED HAT CHANNEL "B" CUT LIST

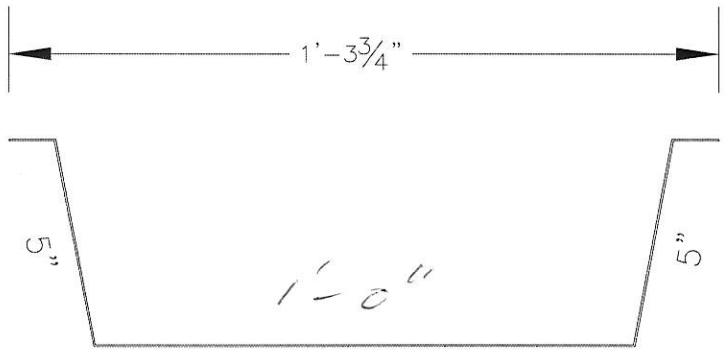
JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

MATERIAL DATA	
GAUGE	20

INPUT PANEL DATA	
O.C. SPACING	15.7500
STRETCH OUT	



QUANTITY	LENGTH FEET	LENGTH INCHES	LENGTH (INCHES)	PROFILE SHAPE	GRID NO.	COMMENTS	LINEAL FEET	NET SQ. FT.	WEIGHT	COMPLETED BY:
228	**8 ft**	**0. in**	96.000	**B**			1824.00	2394.00	0.00	
112	**6 ft**	**0. in**	72.000	**B**			672.00	882.00	0.00	
104	**12 ft**	**0. in**	144.000	**B**			1248.00	1638.00	0.00	
2	**10 ft**	**1.375 in**	121.375	**B**			20.23	26.55	0.00	
2	**10 ft**	**3.063 in**	123.063	**B**			20.51	26.92	0.00	
2	**10 ft**	**4.188 in**	124.188	**B**			20.70	27.17	0.00	
2	**10 ft**	**6.438 in**	126.438	**B**			21.07	27.66	0.00	
2	**10 ft**	**8.25 in**	128.250	**B**			21.38	28.05	0.00	
2	**10 ft**	**9.5 in**	129.500	**B**			21.58	28.33	0.00	
2	**10 ft**	**11.188 in**	131.188	**B**			21.86	28.70	0.00	
2	**11 ft**	**2.25 in**	134.250	**B**			22.38	29.37	0.00	
2	**11 ft**	**3.5 in**	135.500	**B**			22.58	29.64	0.00	
2	**11 ft**	**5.188 in**	137.188	**B**			22.86	30.01	0.00	
2	**11 ft**	**6.438 in**	138.438	**B**			23.07	30.28	0.00	
2	**11 ft**	**8.75 in**	140.750	**B**			23.46	30.79	0.00	
2	**11 ft**	**10.375 in**	142.375	**B**			23.73	31.14	0.00	
2	**6 ft**	**1.375 in**	73.375	**B**			12.23	16.05	0.00	
2	**6 ft**	**3.063 in**	75.063	**B**			12.51	16.42	0.00	
2	**6 ft**	**4.188 in**	76.188	**B**			12.70	16.67	0.00	
2	**6 ft**	**6.438 in**	78.438	**B**			13.07	17.16	0.00	

ROLLFAB PERFORATED HAT CHANNEL "B" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**6 ft**	**8.25 in**	80.250	**B**			13.38	17.55	0.00	
2	**6 ft**	**9.5 in**	81.500	**B**			13.58	17.83	0.00	
2	**6 ft**	**11.188 in**	83.188	**B**			13.86	18.20	0.00	
2	**7 ft**	**0.938 in**	84.938	**B**			14.16	18.58	0.00	
2	**7 ft**	**2.563 in**	86.563	**B**			14.43	18.94	0.00	
2	**7 ft**	**3.875 in**	87.875	**B**			14.65	19.22	0.00	
2	**7 ft**	**5.625 in**	89.625	**B**			14.94	19.61	0.00	
2	**11 ft**	**0.438 in**	132.438	**B**			22.07	28.97	0.00	
2	**10 ft**	**0.438 in**	120.438	**B**			20.07	26.35	0.00	
2	**10 ft**	**2.25 in**	122.250	**B**			20.38	26.74	0.00	
2	**10 ft**	**3.5 in**	123.500	**B**			20.58	27.02	0.00	
2	**10 ft**	**5.188 in**	125.188	**B**			20.86	27.38	0.00	
2	**10 ft**	**7.875 in**	127.875	**B**			21.31	27.97	0.00	
2	**10 ft**	**9.063 in**	129.063	**B**			21.51	28.23	0.00	
2	**10 ft**	**10.688 in**	130.688	**B**			21.78	28.59	0.00	
2	**11 ft**	**0.938 in**	132.938	**B**			22.16	29.08	0.00	
2	**11 ft**	**2.563 in**	134.563	**B**			22.43	29.44	0.00	
2	**11 ft**	**3.875 in**	135.875	**B**			22.65	29.72	0.00	
2	**11 ft**	**5.625 in**	137.625	**B**			22.94	30.11	0.00	
2	**11 ft**	**6.438 in**	138.438	**B**			23.07	30.28	0.00	
2	**11 ft**	**8.25 in**	140.250	**B**			23.38	30.68	0.00	
2	**11 ft**	**9.5 in**	141.500	**B**			23.58	30.95	0.00	
2	**11 ft**	**11.188 in**	143.188	**B**			23.86	31.32	0.00	
2	**6 ft**	**1.375 in**	73.375	**B**			12.23	16.05	0.00	
2	**6 ft**	**3.063 in**	75.063	**B**			12.51	16.42	0.00	
2	**6 ft**	**4.188 in**	76.188	**B**			12.70	16.67	0.00	
2	**6 ft**	**6.438 in**	78.438	**B**			13.07	17.16	0.00	
2	**6 ft**	**8.25 in**	80.250	**B**			13.38	17.55	0.00	
2	**6 ft**	**9.5 in**	81.500	**B**			13.58	17.83	0.00	
2	**6 ft**	**11.188 in**	83.188	**B**			13.86	18.20	0.00	
2	**7 ft**	**1.875 in**	85.875	**B**			14.31	18.79	0.00	
2	**7 ft**	**3.063 in**	87.063	**B**			14.51	19.04	0.00	

ROLLFAB PERFORATED HAT CHANNEL "B" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**7 ft**	**4.688 in**	88.688	**B**			14.78	19.40	0.00	
2	**7 ft**	**6.438 in**	90.438	**B**			15.07	19.78	0.00	
2	**7 ft**	**8.75 in**	92.750	**B**			15.46	20.29	0.00	
2	**7 ft**	**10.375 in**	94.375	**B**			15.73	20.64	0.00	
2	**8 ft**	**1.375 in**	97.375	**B**			16.23	21.30	0.00	
2	**8 ft**	**3.063 in**	99.063	**B**			16.51	21.67	0.00	
2	**8 ft**	**4.188 in**	100.188	**B**			16.70	21.92	0.00	
2	**8 ft**	**6.438 in**	102.438	**B**			17.07	22.41	0.00	
2	**8 ft**	**8.75 in**	104.750	**B**			17.46	22.91	0.00	
2	**8 ft**	**10.375 in**	106.375	**B**			17.73	23.27	0.00	
2	**9 ft**	**0.438 in**	108.438	**B**			18.07	23.72	0.00	
2	**9 ft**	**2.25 in**	110.250	**B**			18.38	24.12	0.00	
2	**9 ft**	**3.5 in**	111.500	**B**			18.58	24.39	0.00	
2	**9 ft**	**5.188 in**	113.188	**B**			18.86	24.76	0.00	
2	**9 ft**	**6.438 in**	114.438	**B**			19.07	25.03	0.00	
2	**9 ft**	**8.25 in**	116.250	**B**			19.38	25.43	0.00	
2	**9 ft**	**9.5 in**	117.500	**B**			19.58	25.70	0.00	
2	**9 ft**	**11.188 in**	119.188	**B**			19.86	26.07	0.00	
2	**9 ft**	**9.813 in**	117.813	**B**			19.64	25.77	0.00	
2	**9 ft**	**11.625 in**	119.625	**B**			19.94	26.17	0.00	
2	**10 ft**	**0.938 in**	120.938	**B**			20.16	26.46	0.00	
2	**10 ft**	**2.563 in**	122.563	**B**			20.43	26.81	0.00	
2	**10 ft**	**3.875 in**	123.875	**B**			20.65	27.10	0.00	
2	**10 ft**	**5.625 in**	125.625	**B**			20.94	27.48	0.00	
2	**10 ft**	**6.5 in**	126.500	**B**			21.08	27.67	0.00	
2	**10 ft**	**8.25 in**	128.250	**B**			21.38	28.05	0.00	
2	**10 ft**	**9.5 in**	129.500	**B**			21.58	28.33	0.00	
2	**10 ft**	**11.188 in**	131.188	**B**			21.86	28.70	0.00	
2	**11 ft**	**0.938 in**	132.938	**B**			22.16	29.08	0.00	
2	**11 ft**	**2.563 in**	134.563	**B**			22.43	29.44	0.00	
2	**11 ft**	**3.875 in**	135.875	**B**			22.65	29.72	0.00	
2	**11 ft**	**5.625 in**	137.625	**B**			22.94	30.11	0.00	

ROLLFAB PERFORATED HAT CHANNEL "B" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**11 ft**	**7.375 in**	139.375	**B**			23.23	30.49	0.00	
2	**11 ft**	**9.063 in**	141.063	**B**			23.51	30.86	0.00	
2	**11 ft**	**10.188 in**	142.188	**B**			23.70	31.10	0.00	
2	**6 ft**	**0.438 in**	72.438	**B**			12.07	15.85	0.00	
2	**6 ft**	**2.188 in**	74.188	**B**			12.36	16.23	0.00	
2	**6 ft**	**3.5 in**	75.500	**B**			12.58	16.52	0.00	
2	**6 ft**	**4.563 in**	76.563	**B**			12.76	16.75	0.00	
2	**6 ft**	**6.438 in**	78.438	**B**			13.07	17.16	0.00	
2	**6 ft**	**8.75 in**	80.750	**B**			13.46	17.66	0.00	
2	**6 ft**	**10.375 in**	82.375	**B**			13.73	18.02	0.00	
2	**7 ft**	**0.438 in**	84.438	**B**			14.07	18.47	0.00	
2	**7 ft**	**2.188 in**	86.188	**B**			14.36	18.85	0.00	
2	**7 ft**	**3.5 in**	87.500	**B**			14.58	19.14	0.00	
2	**7 ft**	**5.125 in**	89.125	**B**			14.85	19.50	0.00	
2	**7 ft**	**6.438 in**	90.438	**B**			15.07	19.78	0.00	
2	**7 ft**	**8.188 in**	92.188	**B**			15.36	20.17	0.00	
2	**7 ft**	**9.5 in**	93.500	**B**			15.58	20.45	0.00	
2	**7 ft**	**11.125 in**	95.125	**B**			15.85	20.81	0.00	
2	**8 ft**	**0.875 in**	96.875	**B**			16.15	21.19	0.00	
2	**8 ft**	**2.563 in**	98.563	**B**			16.43	21.56	0.00	
2	**8 ft**	**3.875 in**	99.875	**B**			16.65	21.85	0.00	
2	**8 ft**	**6.938 in**	102.938	**B**			17.16	22.52	0.00	
2	**8 ft**	**8.563 in**	104.563	**B**			17.43	22.87	0.00	
2	**8 ft**	**9.875 in**	105.875	**B**			17.65	23.16	0.00	
2	**8 ft**	**11.625 in**	107.625	**B**			17.94	23.54	0.00	
2	**9 ft**	**1.875 in**	109.875	**B**			18.31	24.04	0.00	
2	**9 ft**	**3.063 in**	111.063	**B**			18.51	24.29	0.00	
2	**9 ft**	**4.688 in**	112.688	**B**			18.78	24.65	0.00	
2	**9 ft**	**6.438 in**	114.438	**B**			19.07	25.03	0.00	
2	**9 ft**	**8.188 in**	116.188	**B**			19.36	25.42	0.00	
2	**9 ft**	**9.5 in**	117.500	**B**			19.58	25.70	0.00	
2	**9 ft**	**11.188 in**	119.188	**B**			19.86	26.07	0.00	

ROLLFAB PERFORATED HAT CHANNEL "B" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**8 ft**	**5.625 in**	101.625	**B**			16.94	22.23	0.00	
672							**5814.09**	**7631.00**	**0.00**	

NOTE: LENGTHS ARE TO BE IN 1/8" MINIMUM INCREMENTS

ROLLFAB PERFORATED HAT CHANNEL "C" CUT LIST

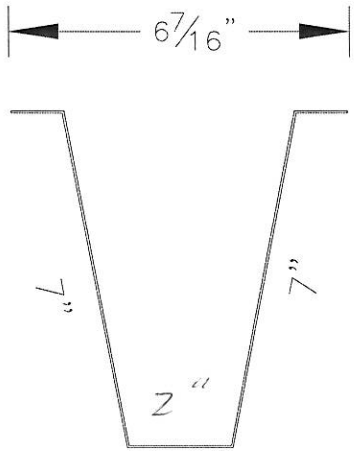
JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

MATERIAL DATA	
GAUGE	20

INPUT PANEL DATA	
O.C. SPACING	6.4380
STRETCH OUT	



QUANTITY	LENGTH FEET	LENGTH INCHES	LENGTH (INCHES)	PROFILE SHAPE	GRID NO.	COMMENTS	LINEAL FEET	NET SQ. FT.	WEIGHT	COMPLETED BY:
110	**8 ft**	**0. in**	96.000	**C**			880.00	472.12	0.00	
44	**6 ft**	**0. in**	72.000	**C**			264.00	141.64	0.00	
64	**12 ft**	**0. in**	144.000	**C**			768.00	412.03	0.00	
2	**10 ft**	**2. in**	122.000	**C**			20.33	10.91	0.00	
2	**10 ft**	**3.625 in**	123.625	**C**			20.60	11.05	0.00	
2	**10 ft**	**10.563 in**	130.563	**C**			21.76	11.67	0.00	
2	**11 ft**	**4.563 in**	136.563	**C**			22.76	12.21	0.00	
2	**11 ft**	**7.063 in**	139.063	**C**			23.18	12.43	0.00	
2	**11 ft**	**7.813 in**	139.813	**C**			23.30	12.50	0.00	
2	**11 ft**	**8.188 in**	140.188	**C**			23.36	12.54	0.00	
2	**11 ft**	**9.813 in**	141.813	**C**			23.64	12.68	0.00	
2	**11 ft**	**10.938 in**	142.938	**C**			23.82	12.78	0.00	
2	**6 ft**	**2. in**	74.000	**C**			12.33	6.62	0.00	
2	**6 ft**	**3.625 in**	75.625	**C**			12.60	6.76	0.00	
2	**6 ft**	**10.563 in**	82.563	**C**			13.76	7.38	0.00	
2	**7 ft**	**1.5 in**	85.500	**C**			14.25	7.65	0.00	
2	**10 ft**	**4.563 in**	124.563	**C**			20.76	11.14	0.00	

ROLLFAB PERFORATED HAT CHANNEL "C" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**10 ft**	**8.438 in**	128.438	**C**			21.41	11.48	0.00	
2	**10 ft**	**10.125 in**	130.125	**C**			21.69	11.64	0.00	
2	**11 ft**	**1.5 in**	133.500	**C**			22.25	11.94	0.00	
2	**11 ft**	**10.563 in**	142.563	**C**			23.76	12.75	0.00	
2	**6 ft**	**2. in**	74.000	**C**			12.33	6.62	0.00	
2	**6 ft**	**3.625 in**	75.625	**C**			12.60	6.76	0.00	
2	**6 ft**	**10.563 in**	82.563	**C**			13.76	7.38	0.00	
2	**7 ft**	**2.438 in**	86.438	**C**			14.41	7.73	0.00	
2	**7 ft**	**4.125 in**	88.125	**C**			14.69	7.88	0.00	
2	**7 ft**	**7.063 in**	91.063	**C**			15.18	8.14	0.00	
2	**7 ft**	**7.813 in**	91.813	**C**			15.30	8.21	0.00	
2	**7 ft**	**8.188 in**	92.188	**C**			15.36	8.24	0.00	
2	**7 ft**	**9.813 in**	93.813	**C**			15.64	8.39	0.00	
2	**7 ft**	**10.938 in**	94.938	**C**			15.82	8.49	0.00	
2	**8 ft**	**2. in**	98.000	**C**			16.33	8.76	0.00	
2	**8 ft**	**3.625 in**	99.625	**C**			16.60	8.91	0.00	
2	**8 ft**	**7.063 in**	103.063	**C**			17.18	9.22	0.00	
2	**8 ft**	**7.813 in**	103.813	**C**			17.30	9.28	0.00	
2	**8 ft**	**8.188 in**	104.188	**C**			17.36	9.32	0.00	
2	**8 ft**	**9.813 in**	105.813	**C**			17.64	9.46	0.00	
2	**8 ft**	**10.938 in**	106.938	**C**			17.82	9.56	0.00	
2	**9 ft**	**4.563 in**	112.563	**C**			18.76	10.06	0.00	
2	**9 ft**	**10.563 in**	118.563	**C**			19.76	10.60	0.00	
2	**10 ft**	**1.5 in**	121.500	**C**			20.25	10.86	0.00	
2	**10 ft**	**10.563 in**	130.563	**C**			21.76	11.67	0.00	
2	**11 ft**	**1.5 in**	133.500	**C**			22.25	11.94	0.00	
2	**11 ft**	**8. in**	140.000	**C**			23.33	12.52	0.00	
2	**11 ft**	**9.625 in**	141.625	**C**			23.60	12.66	0.00	
2	**6 ft**	**4.563 in**	76.563	**C**			12.76	6.85	0.00	
2	**6 ft**	**7. in**	79.000	**C**			13.17	7.06	0.00	
2	**6 ft**	**7.813 in**	79.813	**C**			13.30	7.14	0.00	
2	**6 ft**	**8.125 in**	80.125	**C**			13.35	7.16	0.00	

ROLLFAB PERFORATED HAT CHANNEL "C" CUT LIST

JOB NAME : **PARMLEY BILLINGS LIBRARY** CUSTOMER: **JACKSON CONTRACTING**

JOB NO.: **2202** DETAILER : SS VENDOR: RMP OWNER: RMP

DATE ISSUED : 1/14/13 DATE REQ'D: TBD MATERIAL : 304-2B/SS .127RD x .25STG PERFORATED COLOR : **STAINLESS STEEL**

2	**6 ft**	**9.75 in**	81.750	**C**			13.63	7.31	0.00	
2	**6 ft**	**10.938 in**	82.938	**C**			13.82	7.42	0.00	
2	**7 ft**	**4.563 in**	88.563	**C**			14.76	7.92	0.00	
2	**7 ft**	**10.563 in**	94.563	**C**			15.76	8.46	0.00	
2	**8 ft**	**1.5 in**	97.500	**C**			16.25	8.72	0.00	
2	**8 ft**	**7.5 in**	103.500	**C**			17.25	9.25	0.00	
2	**9 ft**	**2.438 in**	110.438	**C**			18.41	9.87	0.00	
2	**9 ft**	**4.125 in**	112.125	**C**			18.69	10.03	0.00	
2	**9 ft**	**10.563 in**	118.563	**C**			19.76	10.60	0.00	
328							**2893.53**	**1552.38**	**0.00**	

NOTE: LENGTHS ARE TO BE IN 1/8" MINIMUM INCREMENTS

Construction Fasteners

For Concrete:
Aggre-gator® 300 Series Stainless Anchors
ConFlex® Large Diameter Concrete Anchors
Crete-Flex® SS4 Concrete Anchors
UltraCon® Concrete Anchors
Drill Bits (Carbide-Tipped)
MKT Mechanical Anchors

For Metal – No Washer:
Alumi-Flex™ Stainless Steel Drill Screws
Bi-Flex™ 300 Series Stainless Drill Screws
Dril-Flex® Structural Self-Drilling Screws
Drill Screws, Standard, No Washer
Drilit® Wood-to-Metal Reamers
Fab-Lok® Bolt and Sleeve Fasteners
Low Profile Screws for Roof Clips
AllFlex™ Stainless Steel Tapping Screws
Tap-Flex™ Structural Tapping Screws
N Rivets – *Coming Soon*

For Metal – With Washer:
Drill Screws with Bonded Washers
Flo-Seal® Sealing SDS for Metal
TapFast® Sealing SDS for Metal-to-Wood
Topseal™ Stainless Steel Tapping Screws

For Threaded Rod (Sprinkler/HVAC):
HangerMate® Anchoring Systems

Hurricane Storm Protection
Hurricane Storm Panel Fasteners
Hurricane Storm Protection Accessories
Hurricane Storm Panels

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Bi-Flex 300 Series SS Fasteners: 12-14 x 2", 5/16" Hex Head, #2 Point, Box of 200

#12-14 x 2" bi-metal screws with a 300 series stainless steel head and threads fused to hardened steel lead threads and self-drilling point. Stalgard GB coating provides a galvanic barrier. #2 self-drilling point can drill thicknesses up to .140". 5/16" hex drive.

Bi-Flex fasteners provide unmatched corrosion resistance and high performance in a wide range of demanding applications, including aluminum, and are virtually immune to delayed embrittlement failures.

Product No.: HFAJ240P
OEM: Elco
PRICE: $101.73

Quantity: 1

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Note: Prices shown are US$. This web site is not currently able to handle international orders. If you are outside the United States, please call us at 281-488-3900 or e-mail us at support@hurripanel.com to place an order.

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Hurripanel Fasteners Inc.
2128 Springwood • Carrollton, TX 75006 support@hurripanel.com
1.972.417.8882 or toll free 1.877.424.7616

Square drive as indicated in spec does not exist

Per Add#4 - Channel to be passivated after cutting to prevent rust spotting

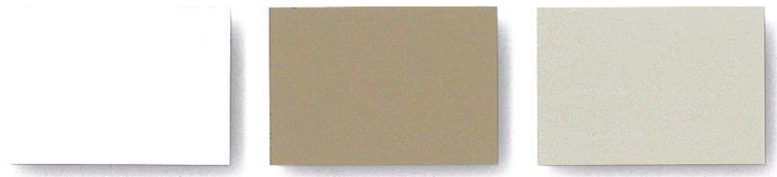
RMP

Pro-Finish 500 Color Guide

ROLLFAB
METAL PRODUCTS

2529 West Jackson Street
Phoenix, AZ 85009
P: (602) 275-1676 F: (602) 275-1739
www.Rollfabmetal.com

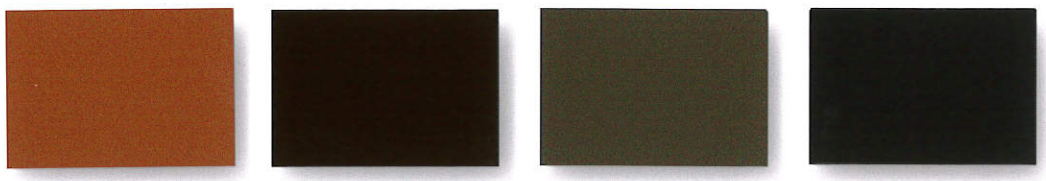
Pro-Finish 500 Cool Primary Selection[1]



Regal White[4]
SR: 0.68 • E: 0.86 • SRI: 82

Sierra Tan[4]
SR: 0.35 • E: 0.86 • SRI: 37

Sandstone[4]
SR: 0.54 • E: 0.86 • SRI: 63

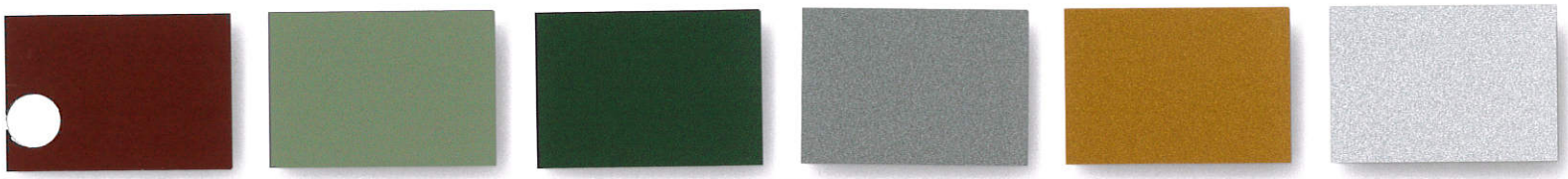


Terra Cotta[4]
SR: 0.35 • E: 0.87 • SRI: 37

Mansard Brown
SR: 0.27 • E: 0.86 • SRI: 26

Medium Bronze[4]
SR: 0.30 • E: 0.87 • SRI: 31

Dark Bronze
SR: 0.26 • E: 0.84 • SRI: 24



L.G. Colonial Red[4]
SR: 0.33 • E: 0.85 • SRI: 35

Patina Green[4]
SR: 0.29 • E: 0.87 • SRI: 29

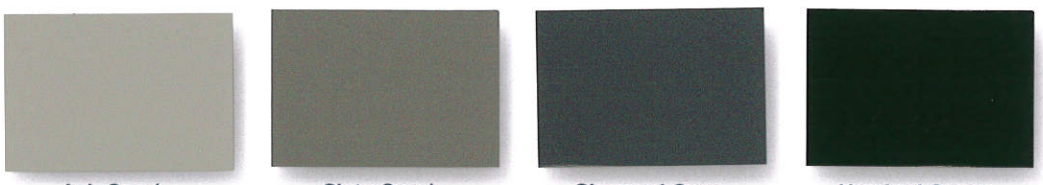
Evergreen
SR: 0.27 • E: 0.85 • SRI: 26

Pre Weathered Galvalume[2]
SR: 0.30 • E: 0.79 • SRI: 27

Copper Metallic[2, 4]
SR: 0.49 • E: 0.85 • SRI: 55

Silver Metallic[2, 4]
SR: 0.60 • E: 0.77 • SRI: 68

Pro-Finish 500 Cool Accent Selection[1, 3]



Ash Grey[4]
SR: 0.39 • E: 0.84 • SRI: 41

Slate Grey[4]
SR: 0.36 • E: 0.84 • SRI: 37

Charcoal Grey
SR: 0.29 • E: 0.84 • SRI: 28

Hartford Green
SR: 0.27 • E: 0.85 • SRI: 26

Regal Blue
SR: 0.26 • E: 0.85 • SRI: 24

Slate Blue
SR: 0.26• E: 0.85• SRI: 24

Brite Red
SR: 0.42 • E: 0.84• SRI: 45

Additional Colors: Special Inquiry

Hemlock Green • Solar White • Stone White
Regal Red • Champagne Metallic

Note:

Longer lead time and added cost may apply to accent colors

Also Available:

- Zincalume Plus® (acrylic coated Galvalume®)

Custom Colors and Small Quantities:

- Available in quantities to a minimum of 1000 lineal feet

Notes:

1 Energy Star qualified products steep slope
2 Standard mica metallic colors with a modest premium
3 Additional lead-time and cost may apply
4 LEED qualified products

Oil Canning:

All flat metal surfaces can display waviness or "oil canning" due to standard mill tolerances. Inherent variations in the substrate surface may affect appearances.

24 Gauge

WE SELL ENERGY STAR

Manufacturers limited paint warranty available at time of purchase on Fluropon® products.
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Galvalume® is a registered trademark of BIEC International Inc.
Zincalume® is a registered trademark of BlueScope Ltd.

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METAL PRODUCTS

Pro-Finish 500 Color Guide

2529 West Jackson Street
Phoenix, AZ 85009
P: (602) 275-1676 F: (602) 275-1739
www.Rollfabmetal.com

Performance Specifications

Specular Gloss at 60° ASTM D 523[2]	Typical standard gloss: 20–35 Typical low gloss: 5-15
Pencil Hardness ASTM D 3363	HB to 2H
T-Bend ASTM D 4145[5]	0T to 3T[3] with no loss of adhesion
Cross Hatch Adhesion ASTM D 3359	No loss of adhesion
Reverse Impact ASTM D 2794[5]	Galvalume® or HDG: 2x[3] metal thickness inch-pounds No loss of adhesion Aluminum: 1.5x metal thickness inch-pounds No loss of adhesion
Humidity Resistance **100% RH 2,000 Hours ASTM D 2247** **100% RH 3,000 Hours ASTM D 2247**	Galvalume® or HDG: no field blisters Aluminum: No field blisters
Salt Spray Resistance **1,000 Hours ASTM B 117** **3,000 Hours ASTM B 117**	Galvalume® or HDG: Creep from scribe no more than 1/16" (2mm), no field blisters Aluminum: Creep from scribe no more than 1/16" (2mm), no field blisters
South Florida Exposure **ASTM D 2244** **ASTM D 4214**	Film Integrity: 35 years Color: No more that 5Δ Hunter units in 30 years Chalk: Rating no less than 8 to 30 years
Flame Test ASTM E 84	Class A coating
Water Immersion 500° hours 100 F ASTM D 870	No loss of adhesion
Dew Cycle Weatherometer 1000 hours ASTM D 3361	Color change: No more than 5Δ Hunter units Chalk: Rating no less than 8
Abrasion Resistance ASTM D 968, Method A	65 ± 10 liters
Application Method	Reverse roll coat
Substrate [1]	Aluminum, HDG or Galvalume®
Viscosity ASTM D 4212 (No. 4 Zahn cup)	20 to 35 seconds
VOC (Theoretical) ASTM D 3960	4.4 to 4.8 pounds per gallon[4]
Clean-Up Solvent	Aromatic Ketone blend
Peak Metal Temperature	460° to 490 °F
Flash Point ASTM D 3278	83° F
Contains Lubricant	Yes
MEK Double Rubs ASTM D 5402	100 Plus
Color Side of Panel Dry Film Thickness ASTM D 1005	Primer: 0.20-0.30 mil Top coat: 0.70-0.80 mil Total system: 0.90-1.1 mil
Reverse Side of Panel Dry Film Thickness ASTM D 1005	Primer: 0.20-0.30 mil Top coat: 0.30-0.40 mil Total System: 0.50-0.70
Resin System	Fluoropolymer system comprised of 70% PVDF resins

Description:

Cool Pro-Finish 500 is a premium Fluropon® fluoropolymer coating system containing 70% PVDF proprietary resins. Cool Pro-Finish 500 is a field-proven, high performance exterior finish. It provides outstanding resistance to ultraviolet rays, exceptional color retention and resistance to chalking and chemical degradation.

Notes:

1 All substrates must be properly pretreated.
2 American Society for Testing and Materials.
3 Fluropon is not designed to bridge cracks in the substrate.
4 Varies by color.
5 Fluropon coatings will generally meet the requirements for most post-painted fabrication processes. However, variations in metal quality, thickness or cleaning/pretreatment applications can lead to diminished flexibility.

24 Gauge

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LEED Information

Rollfab Metal Products uses recycled metal in our roofing components, which are themselves recyclable at the end of their life.

Our standard colors qualify for one credit for the steep slope (>2:12) LEED-NC Credit 2.2 Credit 7.2 Heat Island Effect: Roof in the Sustainable Sites category. The criteria for the points are that the roof must cover at least 75% (excluding skylights and equipment) of the roof surface and have a minimum SRI of 29.
In addition, our standard color Regal White will satisfy the SRI value for LOW SLOPE

Rollfab Metal Products uses coil manufactured by a basic oxygen furnace with approximately 25% postconsumer recycled content and 6.6% postindustrial content. This can contribute to the material and resources 4.1 LEED credit.

Other credits to consider when using Rollfab Metal products for this project:

- Contributes to MR Credit for 1.1 or 1.2 – Building Reuse
- Contributes to MR Credit 2.1 or 2.2 – Construction Waste management
- Contributes to EA Credit – Optimize Energy Performance

Regards,

Steven P. Tetreault
General Sales Manager
Rollfab Metal Products

Arizona Owned *Arizona Made* *Arizona Jobs*

602-275-1676 Fax 602-275-1739
2529 W Jackson Street, Phoenix, Arizona 85009

600 ANDERSEN DRIVE • PITTSBURGH, PA 15220-2700 • PHONE: 412.922.2772 • FAX: 412.922.3213 • WEB: WWW.RECYCLE-STEEL.ORG

2008 The Inherent Recycled Content of Today's Steel

This paper provides an overview of the methods used to produce steel in North America today, and describes steel's inherent recycled content. Contemporary technologies produce steel in two ways, both of which require old steel to make new.

The basic oxygen furnace (BOF) process uses 25 to 35 percent old steel to make new. It produces products—such as automotive fenders, encasements of refrigerators, and packaging like soup cans, five-gallon pails, and 55-gallon drums—whose major required characteristic is drawability.

The electric arc furnace (EAF) process uses more than 80 percent old steel to make new. It produces products— such as structural beams, steel plates, and reinforcement bars—whose major required characteristic is strength.

Many are surprised to learn that steel is the world's, as well as North America's, most recycled material, and in the United States alone, almost 75 million tons of steel were recycled or exported for recycling in 2008. This is done for economic as well as environmental reasons. It is always cheaper to recycle steel than to mine virgin ore and move it through the process of making new steel. However, it should also be clearly understood that many steel applications are durables, and even though two out of every three pounds of new steel are produced from old steel, the fact that cars, appliances, and bridges last a long time makes it necessary to continue to mine virgin ore to supplement the production of new steel. Economic expansion, domestically and internationally, creates additional demand that cannot be fully met by available scrap supplies.

Unlike other competing industries, recycled content in the steel industry is second nature. The North American steel industry has been recycling steel scrap for over 170 years through the growth of 2,500 scrap processors and some 12,500 auto dismantlers. Many of them have been in the business for more than 100 years. The pre-consumer, post-consumer, and total recycled content of steel products in the United States can be determined for the calendar year 2008 using information from the American Iron and Steel Institute (AISI), the Institute of Scrap Recycling Industries (ISRI), and the U.S. Geological Survey. Additionally, a study prepared for the AISI by William T. Hogan, S.A., and Frank T. Koelble of Fordham University is used to establish pre- and post-consumer fractions of purchased scrap.

Individual company statistics are not applicable or instructive because of the open loop recycling capability that the steel and iron industries enjoy, with available scrap typically going to the closest melting furnace. This open loop recycling allows, for example, an old car to be melted down to produce a new soup can, and then, as the new soup can is recycled, it is melted down to produce a new car, appliance, or perhaps a structural beam used to repair some portion of the Golden Gate Bridge.

Basic Oxygen Furnace

The basic oxygen furnace (BOF) facilities consumed a total of 13,867,000 tons of ferrous scrap in the production of 42,206,000 tons of raw steel during 2008. Based on U.S. Geological Survey statistics, 901,000 of these ferrous scrap tons had been generated as unsalable steel product within the confines of these steelmaking sites. In the steel industry, these tons are classified as "home scrap," but are a mix of runaround scrap and pre-consumer scrap. Estimates by the Steel Recycling Institute identify about 80% of this home scrap as pre-consumer scrap, equating to 721,000 tons (901,000 x 80%). Additionally, these operations reported that they consumed 26,000 tons of obsolete scrap (buildings and warehouses dismantled on-site at the mill) during this time frame. This volume is classified as post-consumer scrap.

<TURN OVER>

For more information, please contact the Steel Recycling Institute at 1-412-922-2772, or visit us online at www.recycle-steel.org.

The New Steel

Steel Recycling Institute

As a result of the above, based on the total scrap consumed, outside purchases of scrap equate to 12,940,000 tons [13,867,000 - (901,000 + 26,000)]. According to the Fordham University study, the post-consumer fraction of the purchased ferrous scrap would be 83.4 percent, while 16.6 percent of these purchases would be pre-consumer. This equates to 2,148,000 tons of pre-consumer scrap (12,940,000 x 16.6%). This "prompt scrap" is mainly scrap generated by manufacturing processes for products made with steel.

Therefore, the **total recycled content** to produce the 42,206,000 tons of raw steel in the BOF is:

13,867,000 / 42,206,000 = 32.9%
(Total Tons Ferrous Scrap / Total Tons Raw Steel)

Also, the **post-consumer recycled content** is:

(12,940,000 - 2,148,000) + 26,000 = 10,818,000
and
10,818,000 / 42,206,000 = 25.6%
(Post-Consumer Scrap / Total Tons Raw Steel)

Finally, the **pre-consumer recycled content** is:

(721,000 + 2,148,000) / 42,206,000 =
2,869,000 / 42,206,000 = 6.8%
(Pre-Consumer Scrap / Total Tons Raw Steel)

Electric Arc Furnace

The electric arc furnace (EAF) facilities consumed a total of 50,563,000 tons of ferrous scrap in the production of 56,369,000 tons of raw steel during 2008. Based on U.S. Geological Survey adjusted statistics, 16,365,000 of these ferrous scrap tons had been generated as unsalable steel product within the confines of these steelmaking sites. Again, in the steel industry, these tons are classified as "home scrap," but are a mix of runaround scrap and pre-consumer scrap. Estimates by the Steel Recycling Institute identify about 80% of this home scrap as pre-consumer scrap, equating to 13,092,000 tons (16,365,000 x 80%). Additionally, these operations reported that they consumed 77,000 tons of obsolete scrap (buildings and warehouses dismantled on-site at the mill) during this time frame. This volume is classified as post-consumer scrap.

As a result, based on the total scrap consumed, outside purchases of scrap equate to 34,121,000 tons [50,563,000 - (16,365,000 + 77,000)]. According to the Fordham University study, the post-consumer fraction of the purchased ferrous scrap would be 83.4 percent, while 16.6 percent of these purchases would be pre-consumer. This equates to 5,664,000 tons of pre-consumer scrap (34,121,000 x 16.6%). This "prompt scrap" is mainly scrap generated by manufacturing processes for products made with steel.

Therefore, the **total recycled content** to produce the 56,369,000 tons of raw steel in the EAF is:

50,563,000 / 56,369,000= 89.7%
(Total Tons Ferrous Scrap / Total Tons Raw Steel)

Also, the **post-consumer recycled content** is:

(34,121,000 - 5,664,000) + 77,000 = 28,534,000
and
28,534,000 / 56,369,000 = 50.6%
(Post-Consumer Scrap / Total Tons Raw Steel)

Finally, the **pre-consumer recycled content** is:

(13,092,000 + 5,664,000) / 56,369,000 =
18,756,000 / 56,369,000 = 33.3%
(Pre-Consumer Scrap / Total Tons Raw Steel)

The above discussion and calculations demonstrate conclusively the inherent recycled content of today's steel in North America. To buy steel is to "Buy Recycled."

Understanding the recycled content of BOF and EAF steels, one should not attempt to select one steel producer over another on the basis of a simplistic comparison of relative scrap usage or recycled content. Rather than providing an enhanced environmental benefit, such a selection could prove more costly in terms of total life cycle assessment energy consumption or other variables. Steel does not rely on "recycled content" purchasing to incorporate or drive scrap use. It already happens because of the economics. Recycled content for steel is a function of the steelmaking process itself.

After its useful product life, regardless of its BOF or EAF origin, steel is recycled back into another steel product. Thus steel with more than 80 percent recycled content cannot be described as environmentally superior to steel with 30 percent recycled content. This is not contradictory because they are both complementary parts of the total interlocking infrastructure of steelmaking, product manufacture, scrap generation and recycling. The recycled content of EAF relies on the embodied energy savings of the steel created in the BOF. Steel is truly the most recycled material.

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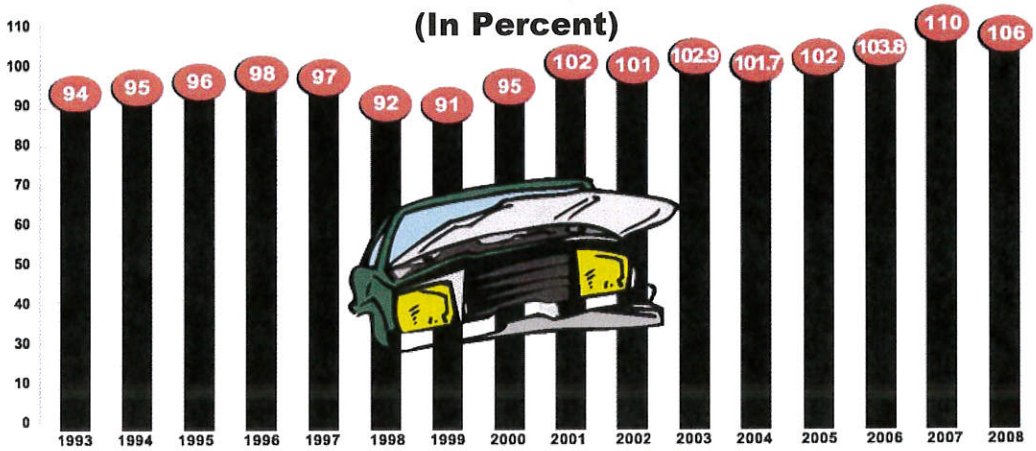
STEEL RECYCLING RATES AT A GLANCE

2008 STEEL RECYCLING RATES

Automotive Recycling Rates

(In Percent)

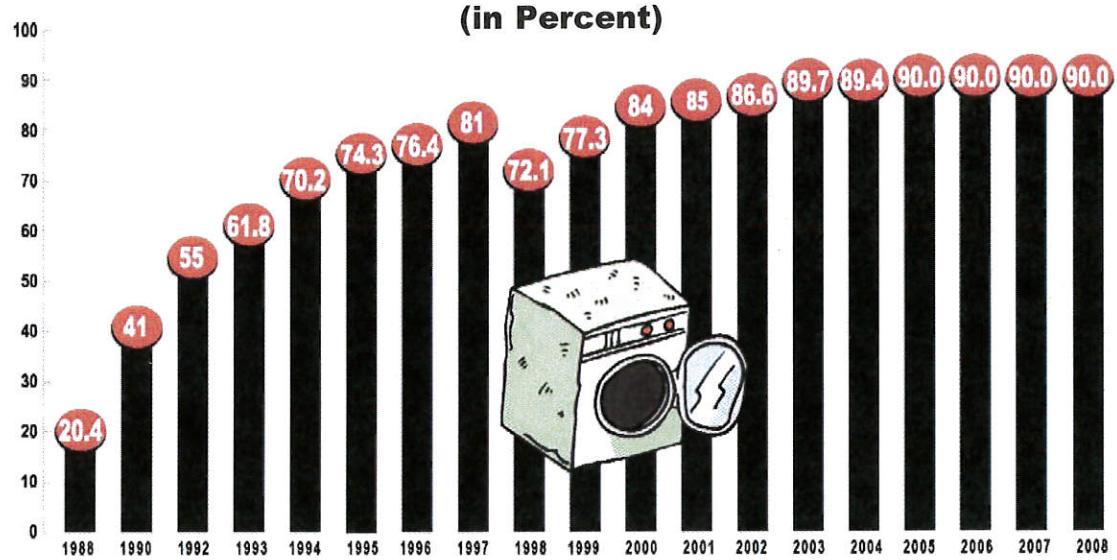


Container Recycling Rates

(in Percent)

Appliance Recycling Rates

(in Percent)



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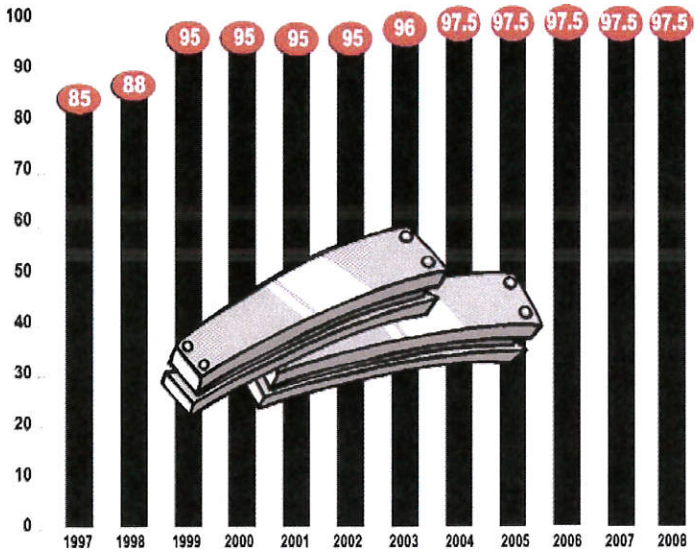
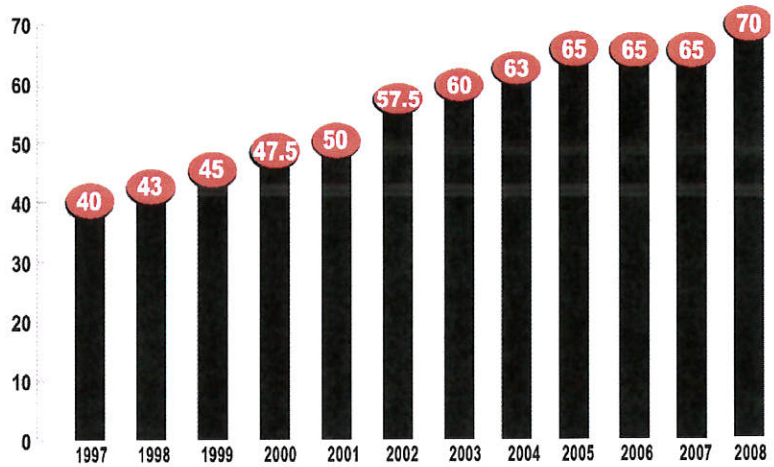
STEEL RECYCLING RATES AT A GLANCE

2008 STEEL RECYCLING RATES

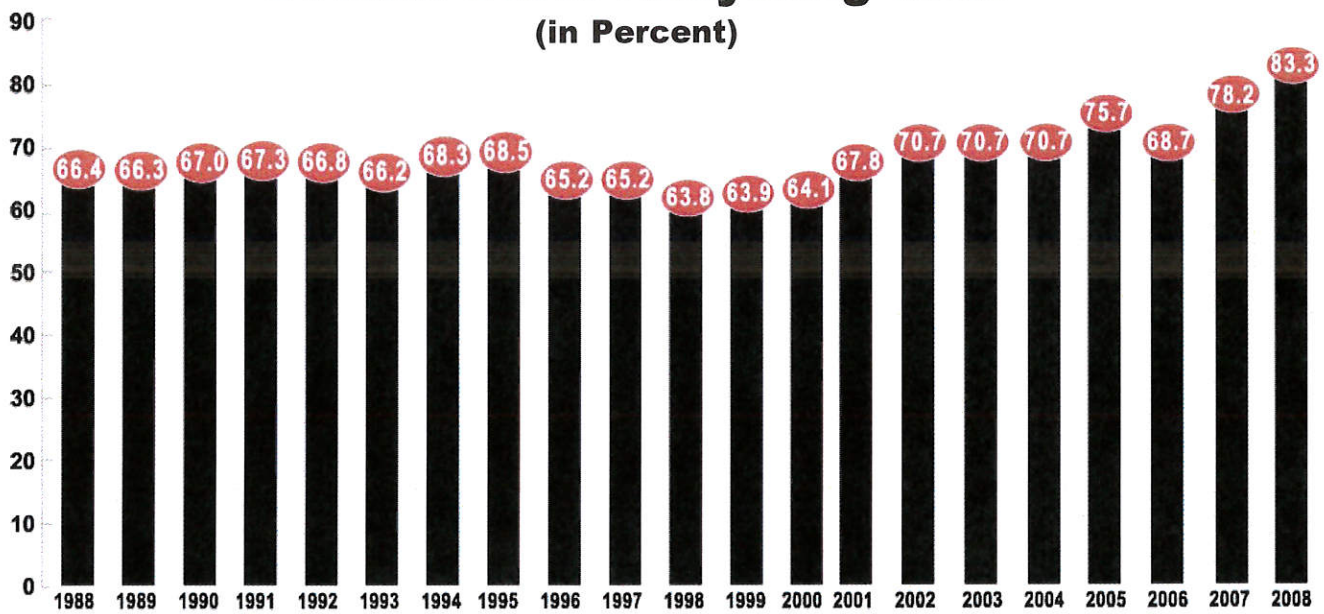
Construction Structural Recycling Rates
(in Percent)



Construction Reinforcement Recycling Rates
(In Percent)



Overall Steel Recycling Rate
(in Percent)



Steel Recycling Institute

The New Steel

THE EnviroMetal

steelscape
A BlueScope Steel Company

May 2009

RE: Information regarding the "recycled content" of Steelscape's products

Dear valued Steelscape product user:

Steelscape has made a commitment to continually improving its environmental footprint and the sustainability of its products. To that end, we are pleased to present to you some basic information to help inform and educate you on the recycled content of our products.

For background, "recycled content" means the proportion of our products that are generated from post-consumer or pre-consumer material. "Post-consumer" is material generated by households and businesses, such as tin cans and old car bodies. "Pre-consumer" refers to materials recovered from the manufacturing process before it is sold to consumers, such as scrap from the car industry sold back to the steel industry. Reutilization of materials, such as scrap within the steelmaking process is not considered pre-consumer material, and thus not included in calculating recycled content.

In Steelscape's case, because we purchase steel coils for use in our manufacturing process, the recycled content of our steel products is directly related to the recycled content of the steel coils we use. Currently, our main steel supplier uses a basic oxygen furnace (BOF) process with a recycled content of 15-20%. On average, the "pre-consumer" portion accounts for 10-15% and the "post-consumer" portion accounts for 5%.

In accordance with the U.S. Green Building Council LEED recycled content requirements, Steelscape does have the ability to supply a higher recycle content steel upon request. This "high-recycled content" steel contains 50-75% recycled content. On average, the "pre-consumer" portion accounts for 20-35% and the "post-consumer" portion accounts for 30-40%.

These recycled content percentages were calculated using the LEED formula:
Recycled Content = (% post-consumer + ½% pre-consumer)

Steelscape's "high-recycled content" steel is available upon request and must be specified at the time of order entry. Please inquire with your Steelscape Sales Representative.

If you need more information or have further questions please feel free to call me direct.

Very truly yours,
STEELSCAPE, INC.
Renee Ramey
Marketing Manager
360-673-8236

Steelscape, Inc. **Kalama** **222 West Kalama River Road** **Kalama, WA 98625-9420 USA**

Phone 360-673-8200 **Fax 360-673-8250**

Steel Takes LEED® with Recycled Content

steel beams and columns

steel studs

steel roofing

steel decking

steel doors

ductwork

steel siding

corrugated steel pipe

other steel components

Designers and builders have long recognized and lauded steel for its strength, durability, and functionality. Increasingly, however, architects are recognizing steel's important environmental attributes—especially its high recycled content and high reclamation rate.

For many years, there has been a strong economic motive to incorporate recycling into the process for making steel, but today's environmental concerns make recycling even more important. Recycling saves money while conserving energy and resources, as well as reducing solid, liquid, and gaseous wastes. Recycling also helps to spread the energy impact of the original extraction and manufacturing of the material over infinite generations of new steel.

The efficiency with which a material is recycled can be measured by either its *percentage of recycled content* or its *reclamation rate.* Recycled content is a measure of how much recycled material is contained in a finished product. The reclamation rate is a measure of how often a product is actually recycled at the end of its useful life. Steel is an exceptional performer by both measurements. In the construction industry, recent interest in recycling has been driven largely by the U.S. Green Building Council's *Leadership in Energy and Environmental Design* (LEED®) rating system. The LEED rating system only promotes the use of materials with high levels of recycled content. The equally important reclamation rate of the materials is not currently considered.

Scrap consumption in the United States is maximized between the two types of modern steel mills, each of which generates products with varying levels of recycled content. One type of mill produces much of the steel for light flat-rolled steel products with about 30% *recycled content*. The other type of mill makes steel for a wide range of products, including flat-rolled, but is the only method used domestically for the production of structural shapes, which have about 80% *recycled content.* (These processes are covered in detail on the following pages.)

The amount of recycled content in steel products varies over time, both as a function of the cost of steel scrap and its availability. As the world-wide demand for steel increases, the available scrap will be stretched between more and more steel products, meaning that more raw steel will have to enter the production stream to meet the demand. Fortunately, steel is the country's most widely recycled material, and as more steel is used for construction and other products, more scrap is available for future recycling. At the end of their useful life, about 88% of all steel products and nearly 100% of structural steel beams and plates used in construction are recycled into new products—an amazing reclamation rate!

In addition to recycled content, steel can contribute toward several other LEED credits, either directly or indirectly. Steel is dimensionally stable and, when properly designed, can provide an exceptionally tight building envelope for less air loss and better HVAC performance over time. Steel is made to exact specifications, so on-site waste is minimized. Material from demolition or construction can be easily recycled, with the magnetic properties of steel greatly facilitating its separation from other materials. Thus, in addition to steel's outstanding recycled content and an enviable reclamation rate, steel's other functional properties contribute to the material's solid environmental performance.

As with any building process or material, there are areas for improvement. A great benefit of LEED is that it can help the steel industry recover even more scrap as contractors improve their recycling collection methods at the job site, so less incidental iron and steel scrap escapes to landfills. Similarly, commercial buildings and residential housing can have better disciplined recycling systems for increased recovery.

As steel products reach the end of their useful life, we want to see even more recycled into new steel products for future service to society.

On-Line Steel Recycling Resources

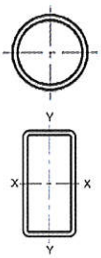
www.recycle-steel.org
Includes detailed information on recycling rates, recycling databases, and the environmental benefits of steel for homes, buildings, steel roofing, and bridges.

www.aisc.org/sustainability
Includes detailed information on how steel factors into the LEED® rating system, steel mill recycled content documentation, and articles about the use of steel in sustainable projects.

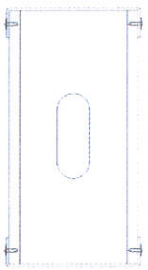
American Iron and Steel Institute

Modern Steel Production Technologies

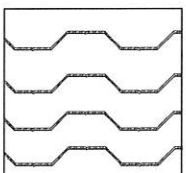
Typical BOF Products



hollow structural sections



steel studs



steel deck

plate

purlins

Steel is the most recycled material in North America and in the world, and in the United States alone, almost 83 million tons of steel were recycled or exported for recycling in 2007. This is done for economic as well as environmental reasons. It is always cheaper to recycle steel than to mine virgin ore and move it through the process of making new steel. However, it should also be clearly understood that many steel applications are durables, and even though two out of every three pounds of new steel are produced from old steel, the fact that cars, appliances, and bridges last a long time makes it necessary to continue to mine virgin ore to supplement the production of new steel. Economic expansion, domestically and internationally, creates additional demand that cannot be fully met by available scrap supplies.

Unlike other competing industries, recycled content in the steel industry is second nature. The **North American steel industry** has been recycling steel scrap for over 170 years through the growth of 2,500 scrap processors and some 12,500 auto dismantlers. Many of them have been in the business for more than 100 years. The pre-consumer, post-consumer, and total recycled content of steel products in the United States can be determined for the calendar year 2007 using information from the American Iron and Steel Institute (AISI), the Institute of Scrap Recycling Industries (ISRI), and the U.S. Geological Survey. Additionally, a study prepared for the AISI by William T. Hogan, S.A., and Frank T. Koelble of Fordham University is used to establish pre- and post-consumer fractions of purchased scrap.

Individual company statistics are not applicable or instructive because of the open loop recycling capability that the steel and iron industries enjoy, with available scrap typically going to the closest melting furnace. This open loop recycling allows, for example, an old car to be melted down to produce a new soup can, and then, as the new soup can is recycled, it is melted down to produce a new car, appliance, or perhaps a structural beam used to repair some portion of the Golden Gate Bridge.

Basic Oxygen Furnace

The basic oxygen furnace (BOF) facilities consumed a total of 14,552,500 tons of ferrous scrap in the production of 44,503,000 tons of raw steel during 2007. Based on U.S. Geological Survey statistics, 950,000 of these ferrous scrap tons had been generated as unsalable steel product within the confines of these steelmaking sites. In the steel industry, these tons are classified as "home scrap," but are a mix of runaround scrap and pre-consumer scrap. Estimates by the Steel Recycling Institute identify about 80% of this home scrap as pre-consumer scrap, equating to 760,000 tons (950,000 × 80%). Additionally, these operations reported that they consumed 10,000 tons of obsolete scrap (buildings and warehouses dismantled on-site at the mill) during this timeframe. This volume is classified as post-consumer scrap.

As a result of the above, based on the total scrap consumed, outside purchases of scrap equate to 13,592,500 tons [14,552,500 – (950,000 + 10,000)]. According to the Fordham University study, the post-consumer fraction of the purchased ferrous scrap would be 83.4%, while 16.6% of these purchases would be pre-consumer. This equates to 2,256,400 tons of pre-consumer scrap (13,592,500 × 16.6%). This "prompt scrap" is mainly scrap generated by manufacturing processes for products made with steel.

Therefore, the **total recycled content** to produce the 44,503,000 tons of raw steel in the BOF is:

14,552,500 / 44,503,000 = 32.7%

(Total Tons Ferrous Scrap / Total Tons Raw Steel)

Also, the **post-consumer recycled content** is:

(13,592,500 – 2,256,400) + 10,000 = 11,346,100

and

11,346,100 / 44,503,000 = 25.5%

(Post-Consumer Scrap / Total Tons Raw Steel)

Finally, the **pre-consumer recycled content** is:

(760,000 + 2,256,400) / 44,503,000 = 3,016,400 / 44,503,000 = 6.8%

(Pre-Consumer Scrap / Total Tons Raw Steel)

Electric Arc Furnace

The electric arc furnace (EAF) facilities consumed a total of 57,199,300 tons of ferrous scrap in the production of 61,329,700 tons of raw steel during 2007. Based on U.S. Geological Survey adjusted statistics, 15,403,700 of these ferrous scrap tons had been generated as unsalable steel product within the confines of these steelmaking sites. Again, in the steel industry, these tons are classified as "home scrap," but are a mix of run-around scrap and pre-consumer scrap. Estimates by the Steel Recycling Institute identify about 80% of this home scrap as pre-consumer scrap, equating to 12,323,000 tons (15,403,700 × 80%). Additionally, these operations reported that they consumed 85,000 tons of obsolete scrap (buildings and warehouses dismantled on-site at the mill) during this time frame. This volume is classified as post-consumer scrap.

As a result, based on the total scrap consumed, outside purchases of scrap equate to 41,710,600 tons [57,199,300 – (15,403,700 + 85,000)]. According to the Fordham University study, the post-consumer fraction of the purchased ferrous scrap would be 83.4%, while 16.6% of these purchases would be pre-consumer. This equates to 6,924,000 tons of pre-consumer scrap (41,710,600 × 16.6%). This "prompt scrap" is mainly scrap generated by manufacturing processes for products made with steel.

Therefore, the **total recycled content** to produce the 61,329,700 tons of raw steel in the EAF is:

57,199,300 / 61,329,700 = 93.3%

(Total Tons Ferrous Scrap / Total Tons Raw Steel)

Also, the **post-consumer recycled content** is:

(41,710,600 - 6,924,000) + 85,000 = 34,871,600

and

34,871,600 / 61,329,700 = 56.9%

(Post-Consumer Scrap / Total Tons Raw Steel)

Finally, the **pre-consumer recycled content** is:

(12,323,000 + 6,924,000) / 61,329,700 = 19,247,000 / 61,329,700 = 31.4%

(Pre-Consumer Scrap / Total Tons Raw Steel)

The above discussion and calculations demonstrate conclusively the inherent recycled content of **today's steel in North America**. To buy steel is to "Buy Recycled."

Understanding the recycled content of BOF and EAF steels, one should not attempt to select one steel producer over another on the basis of a simplistic comparison of relative scrap usage or recycled content. Rather than providing an enhanced environmental benefit, such a selection could prove more costly in terms of total life cycle assessment energy consumption or other variables. Steel does not rely on "recycled content" purchasing to incorporate or drive scrap use. It already happens because of the economics. Recycled content for steel is a function of the steelmaking process itself.

After its useful product life, regardless of its BOF or EAF origin, steel is recycled back into another steel product. Thus steel with more than 80% recycled content cannot be described as environmentally superior to steel with 30% recycled content. This is not contradictory because they are both complementary parts of the total interlocking infrastructure of steelmaking, product manufacture, scrap generation and recycling. The recycled content of EAF relies on the embodied energy savings of the steel created in the BOF.

Steel is truly the most recycled material.

Contact Us

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412.922.2772 • sri@recycle-steel.org
www.recycle-steel.org

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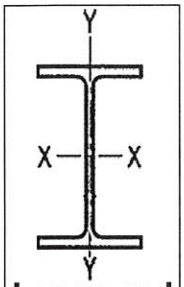
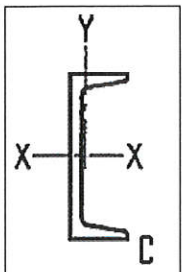
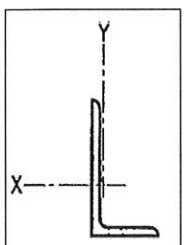
Typical EAF Products



beams and columns



channels



angles

plate

steel deck

piling

To: Architects, Engineers, Designers, and Specifiers
Re: LEED®-NC Version 2.2 and LEED®-NC 2009 Recycled Content Value of Steel Building Products

The U.S. Green Building Council Leadership in Energy & Environmental Design (LEED®) Green Building Rating System aims to improve occupant well-being, environmental performance and economic returns of buildings using established and innovative practices, standards, and technologies.

Materials & Resources Credit 4: Recycled Content intends to increase demand for building products that incorporate recycled content materials, therefore reducing impacts resulting from extraction and processing of new virgin materials. As discussed and demonstrated below, **North American** steel building products contribute positively toward points under Credits 4.1 and 4.2. The following is required by LEED-NC Versions 2.2 and 2009:

> **Credit 4.1 (1 point)** "Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project."
>
> **Credit 4.2 (1 point)** "Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 20% of the total value of the materials in the project."

"The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value." Since steel (the material) and steel (the building product) are the same, the value of the steel building product is directly multiplied by steel's recycled content, or:

Steel Recycled Content Value = (Value of Steel Product) (Post-Consumer % + ½ Pre-Consumer %)

The information contained within this brochure provides post-consumer and pre-consumer recycled content percentages for **North American steel building products**. These percentages and values of steel building products are easily entered into LEED Letter Template spreadsheet for calculation. To illustrate the application of these steel recycled content values to LEED, manual calculations are shown below for typical Basic Oxygen Furnace (BOF) and Electric Arc Furnace (EAF) steel building products with nominal $10,000 purchases, using 2007 data. Steel building products include steel stud framing, structural steel framing (wide-flange beams, channels, angles, etc.), rebar, roofing, siding, decking, doors and sashes, windows, ductwork, pipe, fixtures, hardware (hinges, handles, braces, screws, nails), culverts, storm drains, and manhole covers.

BOF Steel Recycled Content Value for Typical Product:
Steel Stud Framing
Value = ($10,000) (25.5% + ½ 6.8%) = ($10,000) (28.9%) = $2,890
(Positive net contributor to 10% and 20% goals)

EAF Steel Recycled Content Value for Typical Product:
Wide-Flange Structural Steel Framing
Value = ($10,000) (56.9% + ½ 31.4%) = ($10,000) (72.6%) = $7,260
(Positive net contributor to 10% and 20% goals)

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Suite 700
Chicago, IL
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866.ASK.AISC
solutions@aisc.org

American Iron and Steel Institute

American Iron and Steel Institute
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Washington, DC
20036
202.452.7100

Jackson
CONTRACTOR GROUP, INC.
P.O. Box 967, Missoula, MT 59806
406-542-9150 | FAX 542-3515

Submittal Transmittal

Detailed, Grouped by Each Number

Billings Public Library
510 N. Broadway
Billings, MT 59101

Project # 2012.35
Tel: 406-542-9150 Fax: 406-542-3515

Jackson Contractor Group Inc.

Date: 1/3/2014 **Reference Number: 0232**

Transmitted To:
Don Olsen
O2 Architects
208 N. Broadway
Suite 350
Billings, MT 59101
Tel: 406-259-7123
Fax: 406-256-7123

Transmitted By:
Mike Chase
Jackson Contractor Group Inc.
P.O. Box 967
Missoula, MT 59806
Tel: 406.542.9150
Fax: 406.542.3515

Qty	Submittal Package No	Description	Due Date	Package Action
1	0054 - 08 6300 - 3	Metal Framed Skylight - ETFE Skylight Package	1/17/2014	Submitted

Transmitted For	Delivered Via	Tracking Number
Approval	e-mail	

Items	Qty	Description	Notes	Item Action
0001	1	Mtl Frame Skylight - Calculations	Calculations only	Submitted
0002	1	Mtl Frame Skylight - Drawings		Submitted
0003	1	Mtl Frame Skylight - Samples	Foil previously approved, mock-up as requested.	Submitted

Cc:	Company Name	Contact Name	Copies	Notes

Remarks

Final Package for Record

mike chase — **Signature**

1.3.14 — **Signed Date**

Jackson
CONTRACTOR GROUP, INC.
P.O. Box 967, Missoula, MT 59806
406-542-9150 | FAX 542-3515

Submittal Packages

Summary with Register Items & Stamp

Billings Public Library
510 N. Broadway
Billings, MT 59101

Project # 2012.35

Jackson Contractor Group Inc.
Tel: 406-542-9150 Fax: 406-542-3515

Item No	Register No	Rev	Spec Section	Sub Section	Description	Responsible	Supplier	Rec'd On	Action
0054 - 08 6300 - 3			**Metal Framed Skylight - ETFE Skylight Package**						
0001	00194	3	08 63 00	1.03.A	Mtl Frame Skylight - Calculations	Vectorfoiltec, LLC	Texlon	1/3/2014	Submitted
0002	00195	3	08 63 00	1.03.B	Mtl Frame Skylight - Drawings	Vectorfoiltec, LLC	Texlon	1/3/2014	Submitted
0003	00196	3	08 63 00	1.03.C	Mtl Frame Skylight - Samples	Vectorfoiltec, LLC	Texlon	1/3/2014	Submitted

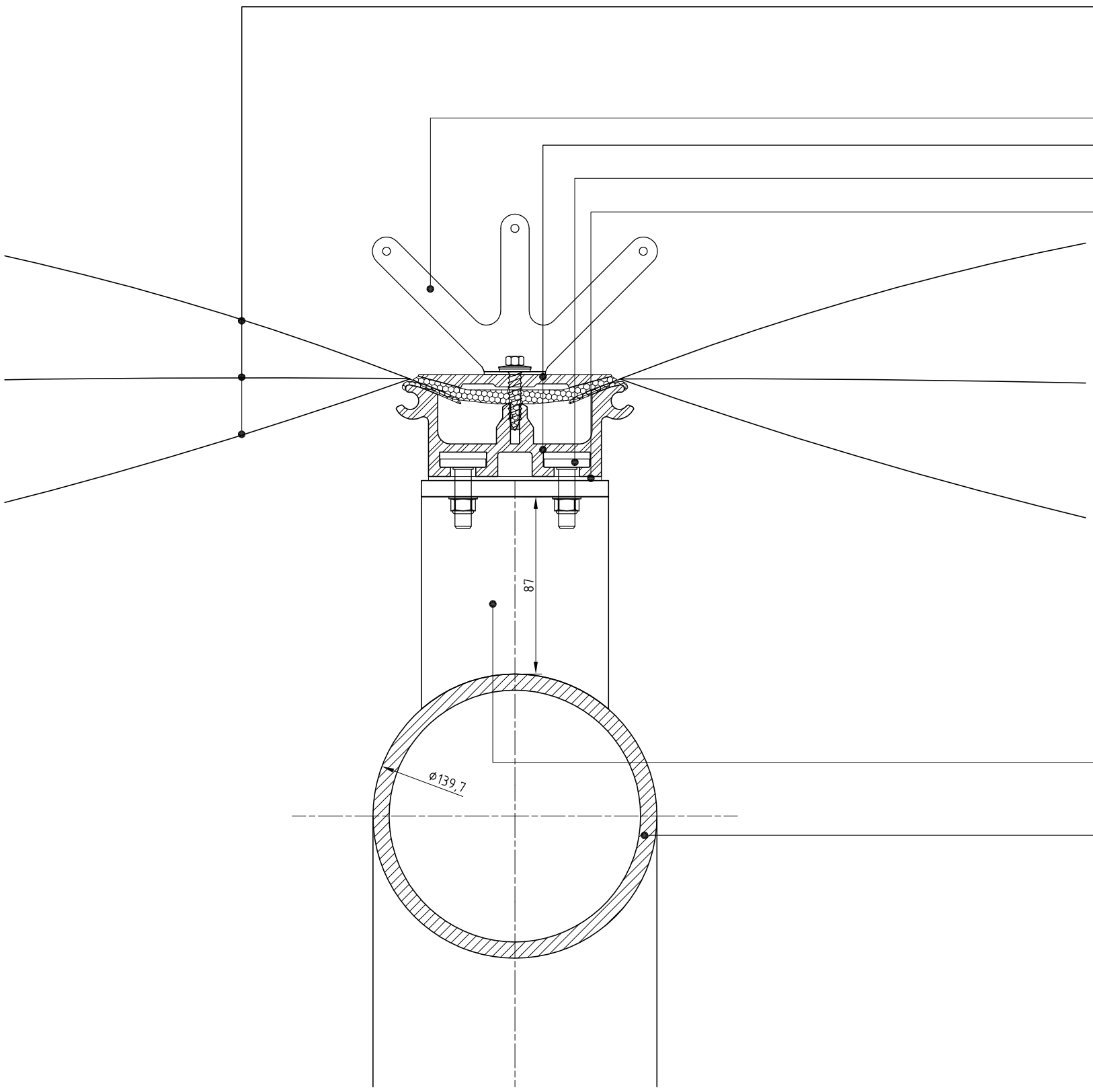
SUBMITTAL REVIEW

__REVIEWED, NO EXCEPTIONS TAKEN __REVISE AND RESUBMIT
__NOTE COMMENTS __SEE ATTACHED COMMENTS

Corrections or comments made to the shop drawings during this review do not relieve subcontractor/vendor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The subcontractor/vendor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of all other trades, and performing his work in a safe and satisfactory manner.

JACKSON CONTRACTOR GROUP, INC.

BY mike chase DATE 1.3.14



Texlon cushion, 3-layer:
top layer 250µm, DM16:50 ink. 31880
middle layer 100µm, DR16-46:41 ink. 31880
bottom layer 200µm, clear
(vector foiltec)

bird wire bracket, 3 ponged, V2A, e=ca.1500mm (vector foiltec)

Texlon extrusion F16.2, cap + base mill finish (vector foiltec)

hammer head bolt M8x40, V2A (vector foiltec)

EPDM layer, 2mm, black (vector foiltec)

T-upstand, C3 coated, RAL9006, every 800-1000mm (vector foiltec)

arch beam CHS139,7mm, C3 coated, RAL9006 (vector foiltec)

Date	Rev	Rev.- Name	Revision
09.09.2013	C	JE	steel changed according to new roof geometry + structural engineering
26.03.2013	B	JE	steel changed according to structural engineering
22.01.2013	A	LL	amended air supply

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Telefax +49-(0)-421-69351-19
de@vector-foiltec.com

Drawing: Detail Beam

Project status: Construction

Scale/ Unit: 1:2,5 mm

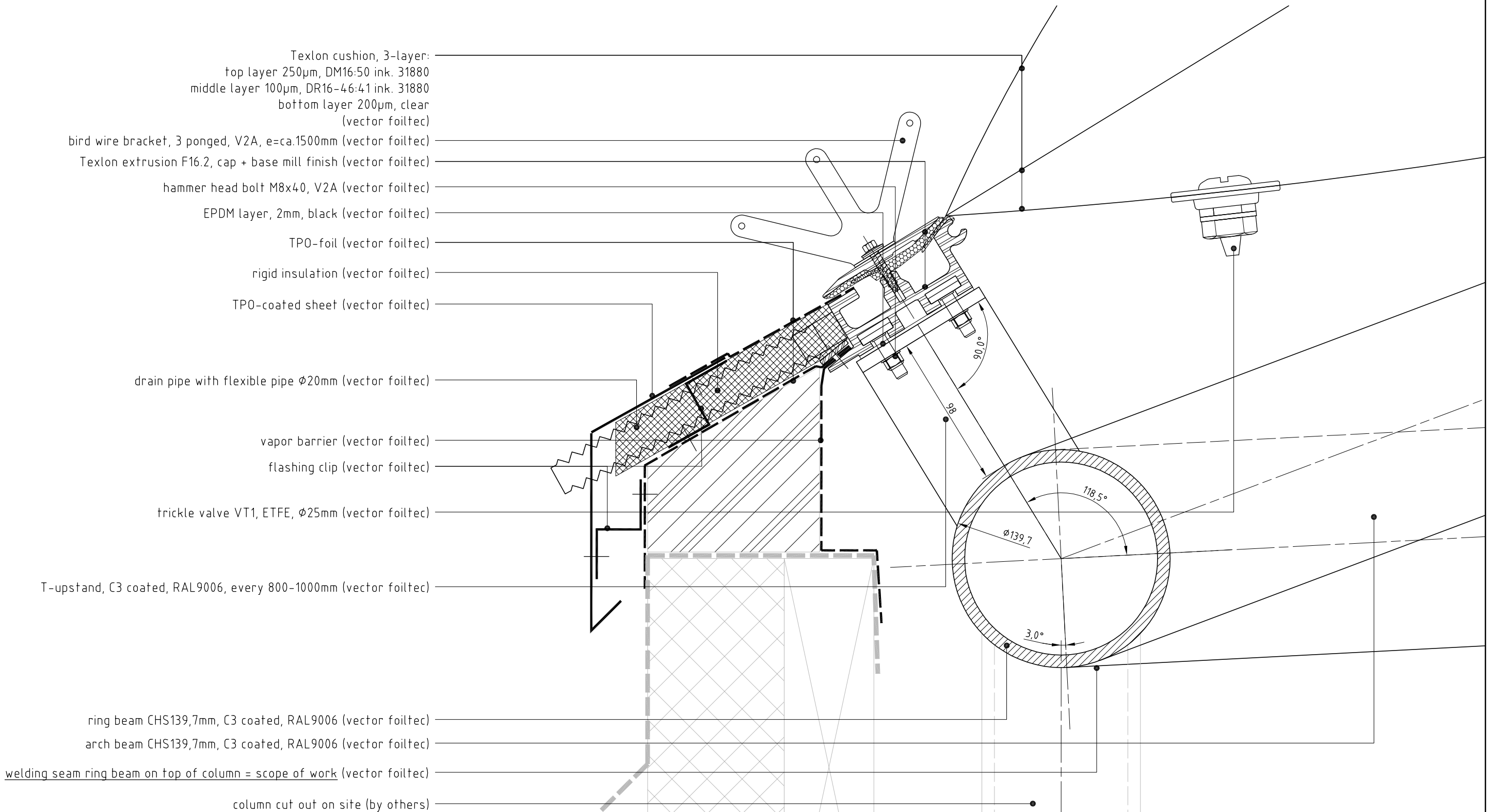
Size: A3

Drawn by	Date	Checked by	Project	Drawing No	Rev
JE	11/27/2012	XX	US - Billings MT - Parmly Library	1059_2002	C

File: G:\PROJEKTE\US - Billings MT - Parmly Library - 1059\Zeichnungen VF DE\2000_Details Details\1059_2001_2002_2003_RevC_Details.dwg

Date: 09.09.2013 14:56:16

Remarks
Do not scale from this drawing - All dimensions in millimetres unless otherwise noted.



Date	Rev	Rev.- Name	Revision
09.09.2013	C	JE	steel changed according to new roof geometry + structural calculation
26.03.2013	B	JE	steel changed according to structural calculation
22.01.2013	A	LL	amended air supply

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de@vector-foiltec.com

Drawing: Detail Perimeter low point

Project status: Construction

Scale/ Unit: 1:2,5 mm

Size: A3

Drawn by	Date	Checked by	Project	Drawing No	Rev
JE	11/27/2012	XX	US - Billings MT - Parmly Library	1059_2003	C

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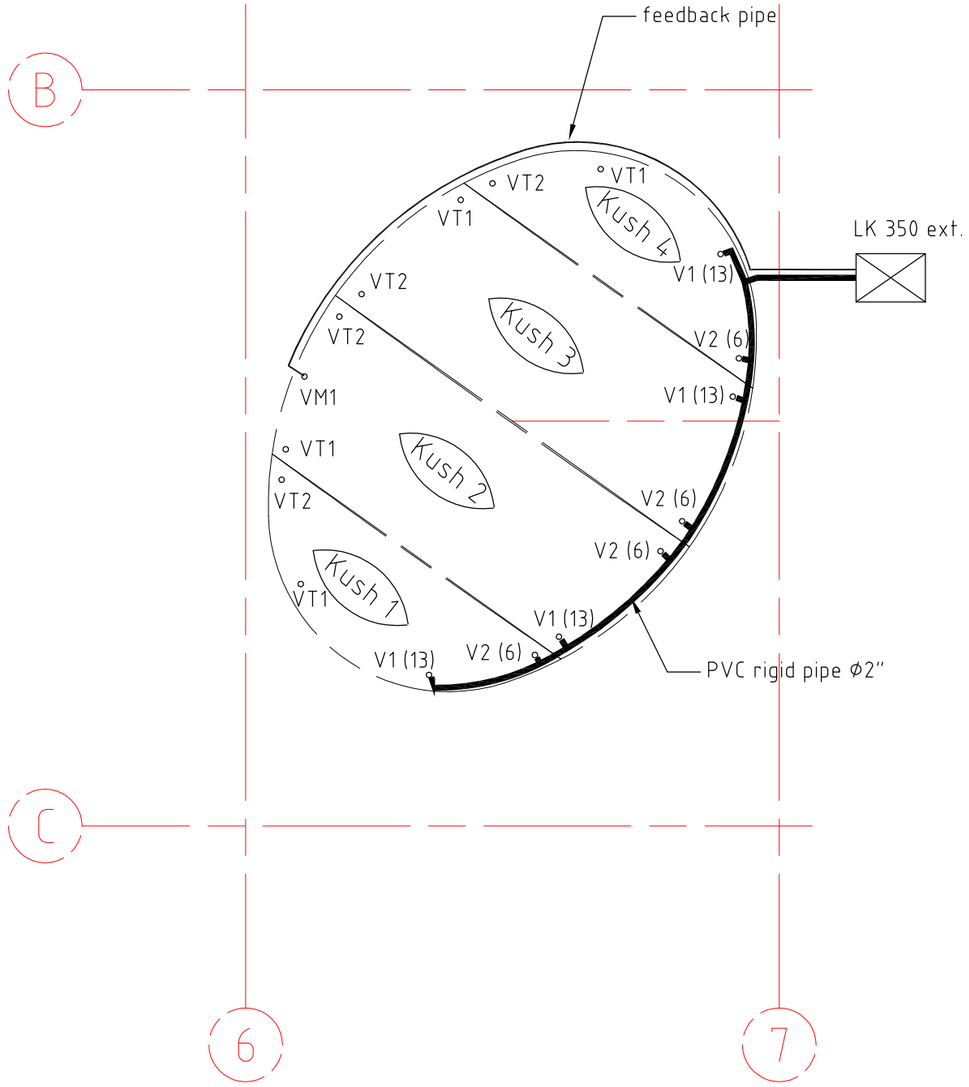
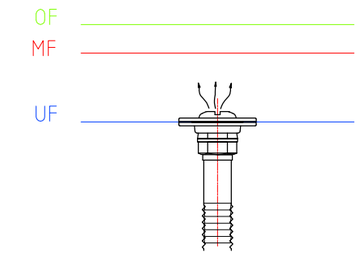
Date: 09.09.2013 15:12:00

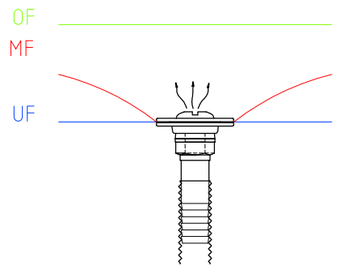
Remarks



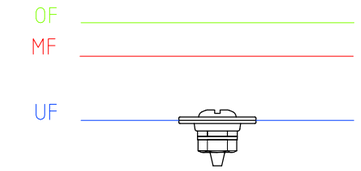
001 / 1059_2900 — plan view skylight air supply



002 / 1059_2900 — V1 (Φ25/Φ13) distance 280mm



003 / 1059_2900 — V2(Φ25/Φ6) distance 180mm



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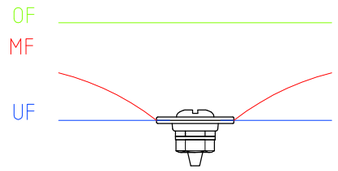

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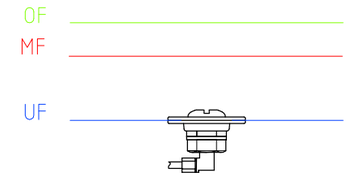
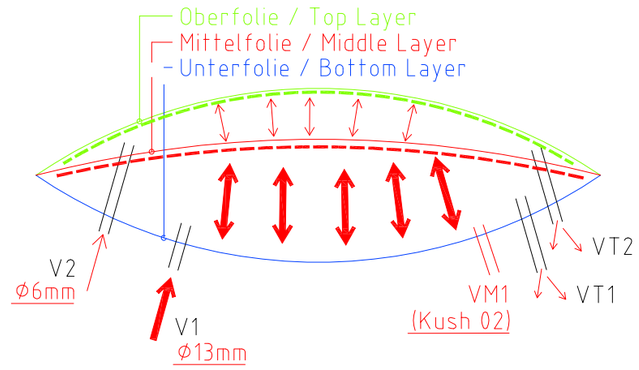


006 / 1059_2900 — VM1 (Φ25) distance 280mm



Date	Rev	Rev.- Name	Revision
08/13/2013	C	JE	general amendments - new roof geometry
01/23/2013	B	JE	valve position changed
12/20/2012	A	A. Blohm	amended middle foil

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Drawing: General Arrangement air supply

Project status: Construction

Scale/ Unit: NTS

Size: A3

Drawn by	Date	Checked by	Project	Drawing No	Rev
JE	12/07/2012	XX	US - Billings MT - Parmly Library	1059_2900	C

File: G:\PROJEKTE\US - Billings MT - Parmly Library - 1059\Zeichnungen VF DE\2900__Lüfterkiste Inflation unit\1059_2900c_GA air supply.dwg

Date: 13.08.2013 14:11:52

Remarks
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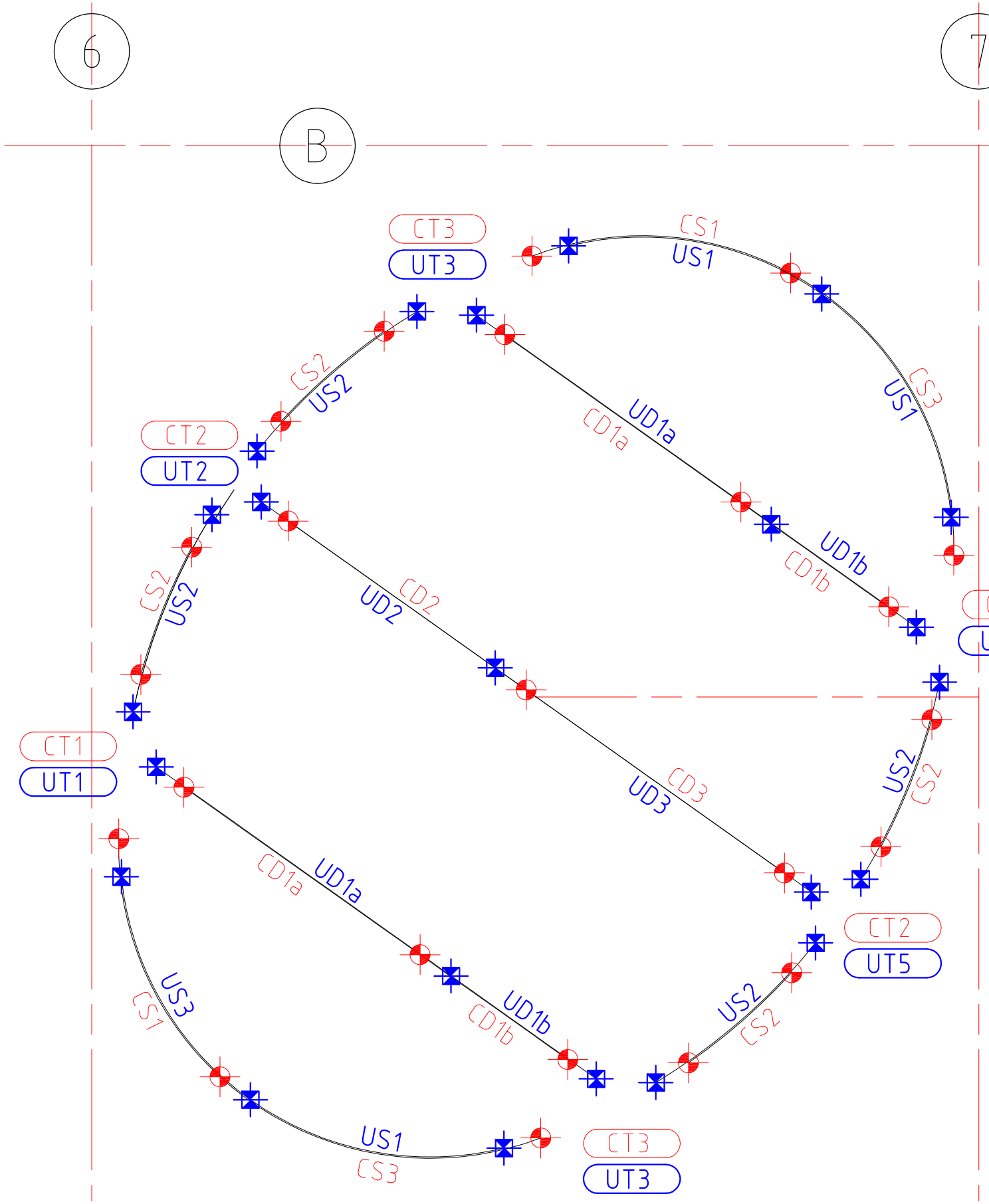

001
1059_5000

plan view skylight

General arrangement

Cap Joint

Base Joint

29.08.2013	B	AE	devided UD1 in UD1a+b, changed CD1 to CD1a+b
19.08.2013	A	AE	complete new
Date	Rev	Rev.- Name	Revision

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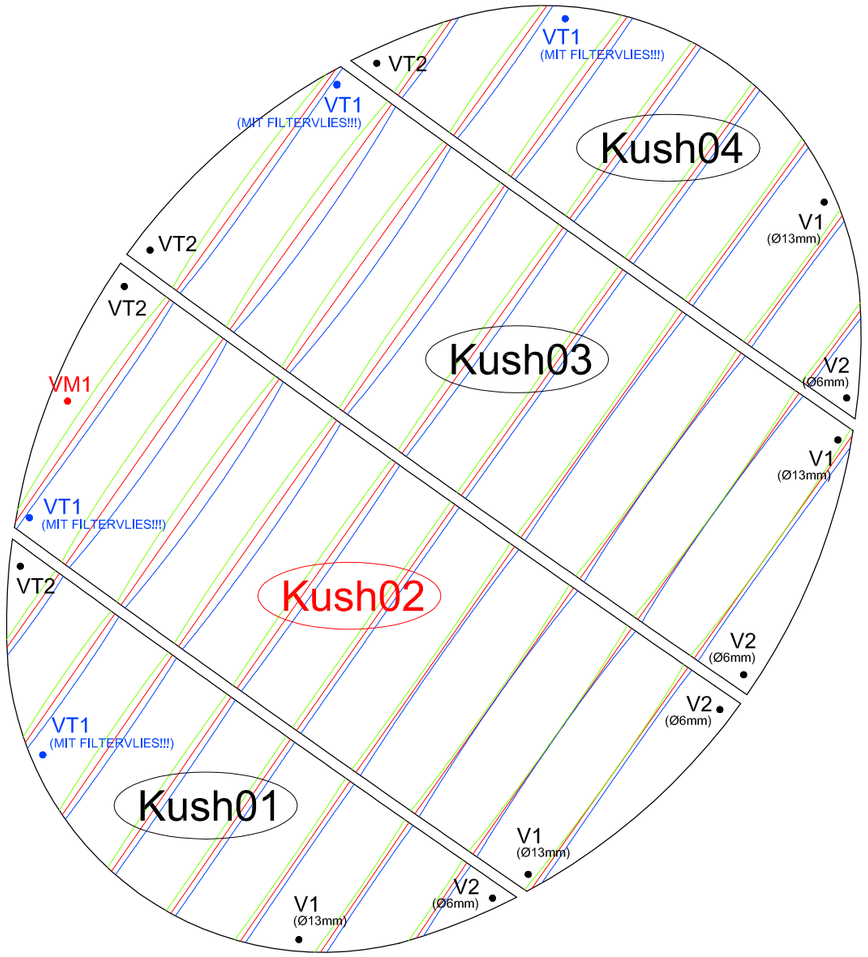
Drawing: General Arrangement F16.2 Extrusion

Project status: Construction

Drawn by	Date	Checked by	Project	Scale/ Unit	Size	Drawing No	Rev
JE	12/11/2012	XX	US - Billings MT - Parmly Library	NTS	A3	1059_5000	B

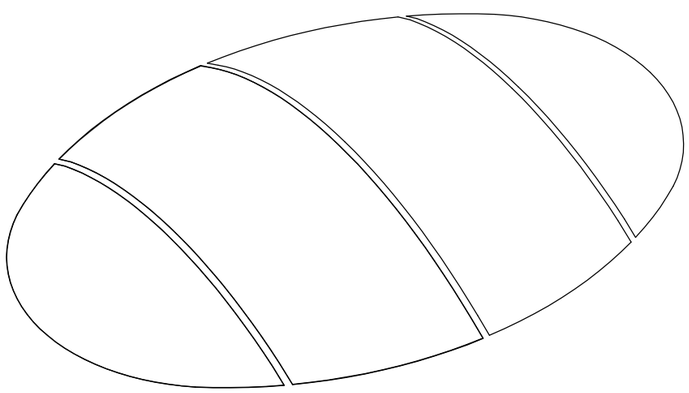
File: G:\PROJEKTE\US - Billings MT - Parmly Library - 1059\Zeichnungen VF DE\5000-6000_Profile Extrusions\1059_5000b_GA_extrusions_RevB.dwg Date: 29.08.2013 10:07:05



001
1059_9000

Übersicht - Kissen, GA - cushions

nts



002
1059_9000

Isometrie, isometric view

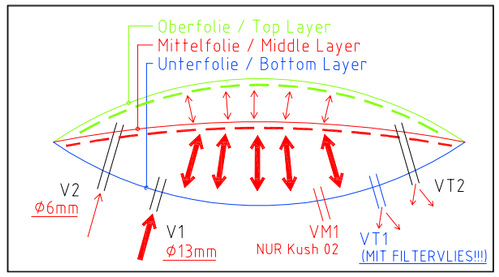
nts

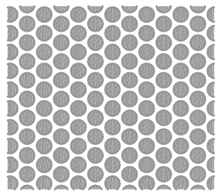
foil make-up:

Oberfolie (OF) / top layer (TL):	200µm - DM 16:50 ink. 31880
Mittelfolie (MF) / middle layer (ML):	100µm - DR 16-46:41 ink. 31880
Unterfolie (UF) / bottom layer (BL):	200µm - clear

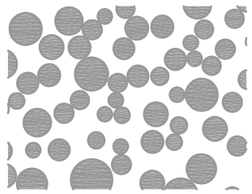
valves:

V1 (Ø25mm, 13mm):	distance from foiledge 280mm
V2 (Ø25mm, 6mm):	distance from foiledge 180mm
VT1 (Ø25mm) **MIT FILTERVLIES!!!**	distance from foiledge 280mm
VT2 (Ø25mm):	distance from foiledge 180mm
VM1 (Ø25mm) *NUR Kush 02*:	distance from foiledge 280mm





DM 16:50 ink. 31880



DR 16-46:41 ink. 31880

Kissenfläche / cushion area: 60,52m²

12.08.2013	A	A. Janßen	new geometry
Date	Rev	Rev.- Name	Revision

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Drawing: Übersicht - Kissen General Arrangement (GA) - cushions Kush 01-04				Project status: CONSTRUCTION	
				Scale/ Unit: NTS	Size: A3
Drawn by: A. Blohm	Date: 18.01.2013	Checked by: XX	Project: US - Billings MT - Parmly Library	Drawing No: 1059_9000	Rev: A

File: Print Date:

vectorfoiltec

www.vector-foiltec.com

US - Data Sheet for Inflation Unit LK-350-115V IP65
For TEXLON® Systems

OPERATION AIR
OUTLET ∅ 3.93''

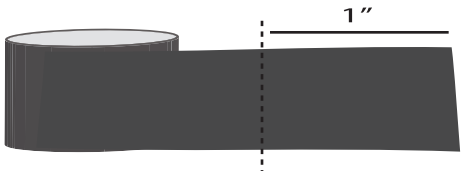
DIMENSIONS :	31.49'' × 23.6'' × 13.7''
LOCATION FOR INSTALLATION:	OUTSIDE
HOUSING: POWDER COATED:	STEEL SHEET 0,03" RAL 7035, LIGHT GREY
2 OPEN AREA AIR INTAKES:	RECTANGULAR, 11.6'' × 11.6''
DIAMETER AIR OUTLET:	∅ 3.93''
VOLUME FLOW RATE.	APPROX. 175 CFM
WEIGHT:	APPROX. 145.5 LBS
POWER REQUIRED: POWER SYSTEM: CONNECTION CABLE: FUSES:	 WYE POWER CONNECTION, SYSTEM VOLTAGE: 208VAC(208VAC BETWEEN PHASE AND PHASE AND 115VAC BETWEEN PHASE AND NEUTRAL) 5 WIRES WITH 3 CIRCUITS, N, PE FOR EACH CIRCUIT USE SINGLE SLOW-BLOW FUSE WITH 25AMP EACH THE UNIT MAKES USE OF THE SECONDARY VOLTAGE (115VAC) ONLY.
POWER CONSUMPTION: NORMAL MODE: OPERATION UPSET ("BACK-UP"):	 185W 370W
OPTIONAL:	CONNECTION EXTERN (SIGNAL LAMP) OR BUILDING MANAGEMENT SYSTEM
NOISE DEVELOPMENT: NORMAL MODE: OPERATION UPSET ("BACK-UP"):	 APPROX. 56 DB(A) APPROX. 59 DB(A)

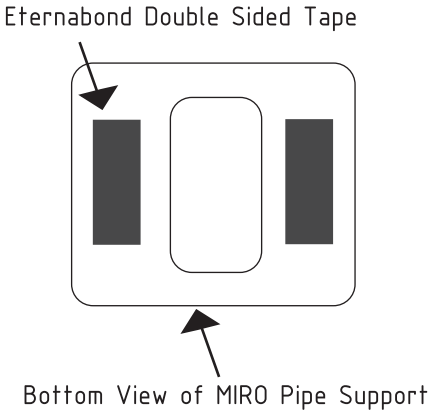
Print Date: 24.08.2012

Two Sided Eternabond Tape - Directions for use with MIRO Support

1. Clear an clean area of roof membrane.
2. Cut two 1" wide x 1" length strips.
3. Apply tape to two sides of the bottom of every MIRO pipe support.
4. Turn MIRO pipe support over and attach on desired area of roof membrane. Pipe support will not move after initial contact. Make sure to have desired location ready before attaching the MIRO pipe support.

* Eternabond double sided tape is compatible with all roof membranes.
* MIRO will not be responsible for location or workmanship of attachment





Direcciones para utilizar Eternabond Tape de Doble Lado con el soporte fabricado por Industrias MIRO

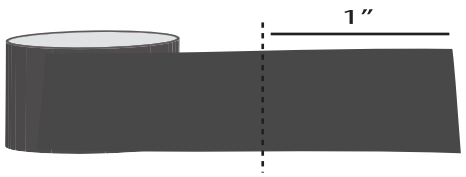
1. Limpie la area del techo donde va a posicionar los soportes.
2. Corte pedasos de tape que miden 1" x 1".
3. Aplique la cinta adhesiva a un lado debajo de cada tercer MIRO soporte.
4. Aplique el soporte MIRO en el puesto deseado. El soporte no se va a mover despues del inicio contacto con la superficie del techo. Asegurese que la area donde va a posicionar el soporte estece listo y limpio.

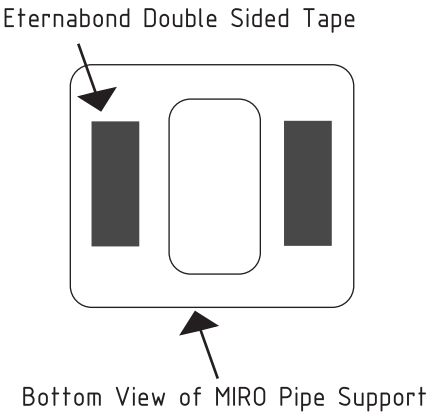
* Eternabond tape es comparable con toda clase de techos.
* MIRO no mantiene responsabilidad sobre la mano de obra en la posicion del soporte, ni la colocacion del soporte.

Two Sided Eternabond Tape - Directions for use with MIRO Support

1. Clear an clean area of roof membrane.
2. Cut two 1" wide x 1" length strips.
3. Apply tape to two sides of the bottom of every MIRO pipe support.
4. Turn MIRO pipe support over and attach on desired area of roof membrane. Pipe support will not move after initial contact. Make sure to have desired location ready before attaching the MIRO pipe support.

* Eternabond double sided tape is compatible with all roof membranes.
* MIRO will not be responsible for location or workmanship of attachment





Direcciones para utilizar Eternabond Tape de Doble Lado con el soporte fabricado por Industrias MIRO

1. Limpie la area del techo donde va a posicionar los soportes.
2. Corte pedasos de tape que miden 1" x 1".
3. Aplique la cinta adhesiva a un lado debajo de cada tercer MIRO soporte.
4. Aplique el soporte MIRO en el puesto deseado. El soporte no se va a mover despues del inicio contacto con la superficie del techo. Asegurese que la area donde va a posicionar el soporte estece listo y limpio.

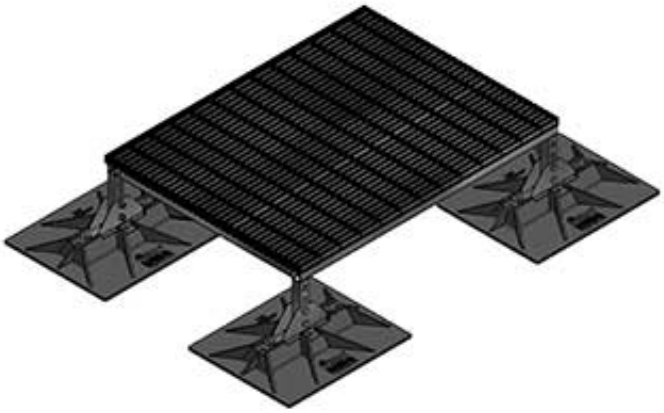
* Eternabond tape es comparable con toda clase de techos.
* MIRO no mantiene responsabilidad sobre la mano de obra en la posicion del soporte, ni la colocacion del soporte.

Mechanical Unit Supports » Mechanical Unit Support-HD

Used to elevate rooftop mechanical units. Heavy Duty Use.

Download Specs (PDF)
Download Drawings (PDF)
Download Drawings (DWG)

Product Description: MIRO Mechanical Unit Supports are supports to elevate rooftop mechanical units such as air conditioning or other devices. The Mechanical Unit Supports are designed so that the mechanical units rest in heavy-duty corner or side supports which are connected to bases designed with MIRO technology to protect the roof membrane. The Mechanical Unit Supports are adjustable in that the strut can be selected to the appropriate height and there is provided an additional threaded rod which allows fine adjustment to level the roof-top units. All metal pieces are made out of hot-dip galvanized steel for outdoor weathering protection. The MIRO Mechanical Unit Support consists of (1) a MIRO designed base with gently curved edges to protect the roof membrane and to distribute the weight over the maximum roof surface, (2) hot-dip galvanized steel strut and all-thread height adjustable column.



Mechanical Unit Support-HD

Key Information » Mechanical Unit Support-HD

Base Material:	MIRON TPC® or Polycarbonate Stainless Galvanized
Size:	Custom design required
Max Load Weight:	Maximum load weight is equivalent to and is part of the maximum roof top bearing load which MIRO has designed for its bases. MIRO recommends such loading not exceed two pounds per square inch.
Spacing:	The Mechanical Unit Support should be spaced at intervals so as to allow proper installation of the mechanical units or devices.

Patent numbers: 4502653; 4513934; 6364256; 6520456; D496058; D490295; D427049; D433615; D436522; D466393; D466394; D498133; D498660; D498661 and other patents pending

More Mechanical Unit Supports from MIRO®

Mech Support-LD

MIRON TPC® or Polycarbonate

Mech Support-HD

MIRON TPC® or Polycarbonate Stainless Galvanized

PRODUCTS » Pipe Supports | Conduit Supports | Pipe Hangers

Duct or "H" Type and Cable Tray Supports | Mechanical Unit Supports

Bridge Crossover & Ramp | Walkway & Service Platform

Seismic & Wind Up-Lift | Accessories | UNI-FLEX

Rooftop Sleeper Support

Contact Us | Catalog Request | Order Form | Rep Locator | Legal & Privacy | Rep Login | Site Map

Conduit Supports » Model 12-Base Strut-7 SS

12" strut pipe support system used for ganging roof-mounted gas pipe.

Download Specs (PDF)
Download Drawings (PDF)

Product Description: A pipestand with a strut and clamp pipe support system used for ganging roof-mounted gas pipes, electrical conduit, solar piping and other mechanical piping. Unique design absorbs thermal expansion and contraction of pipes thus preventing damage to the roof membrane. Pipes rest on a 12" length of strut which is mounted on the base. The pipes can then be fastened by using typical clamps locked to the strut.

Model 12-Base Strut-7 SS

Key Information » Model 12-Base Strut-7 SS

Base Material:	Stainless
Size:	The deck base is 12" by 16" , has a maximum bar length of 12".
Max Pipe Clearance:	Can adjust in height from a low of 2.5" to a high of 7.5" in elevation above the roof membrane.
Max Load Weight:	Maximum load weight may not exceed 150 lbs. per pipestand.
Spacing:	Manufacturer's recommended spacing is not to exceed 10 foot centers depending upon the load. Do not exceed 100 lbs. load weight.

Patent numbers: 4502653; 4513934; 6364256; 6520456; D496058; D490295; D427049; D433615; D436522; D466393; D466394; D498133; D498660; D498661 and other patents pending

More Conduit Supports from MIRO®

2.5-CS-2

MIRON TPC™ or Polycarbonate

2.5-CS-5

MIRON TPC™ or Polycarbonate

2.5-CS-7

MIRON TPC™ or Polycarbonate

2.5-CS-12

MIRON TPC™ or Polycarbonate

12-Base Strut-7

Stainless Galvanized

16-Base Strut-7

MIRON TPC™ or Polycarbonate Stainless Galvanized

16-Base Strut-12

MIRON TPC™ or Polycarbonate

20-Base Strut-7

MIRON TPC™ or Polycarbonate

20-Base Strut-12

MIRON TPC™ or Polycarbonate

24-Base Strut-4

MIRON TPC™ or Polycarbonate

24-Base Strut-18

MIRON TPC™ or Polycarbonate

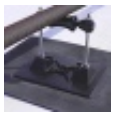
PRODUCTS » Pipe Supports | Conduit Supports | Pipe Hangers

Duct or "H" Type and Cable Tray Supports | Mechanical Unit Supports

Bridge Crossover & Ramp | Walkway & Service Platform

Seismic & Wind Up-Lift | Accessories | UNI-FLEX

Rooftop Sleeper Support

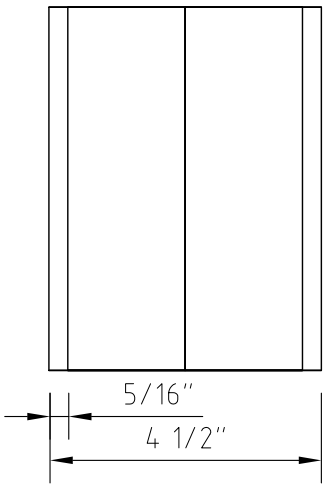


MIRO Industries, Inc.

Like 144

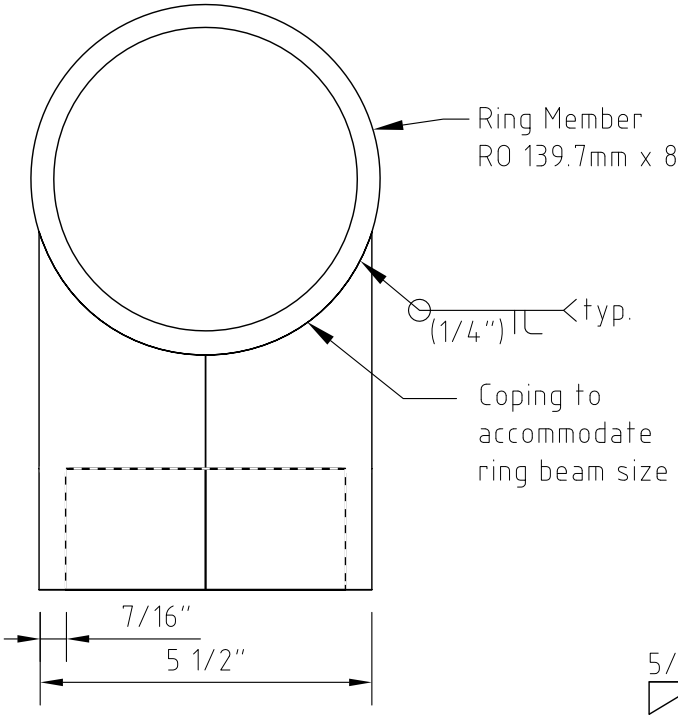
001 beam con.

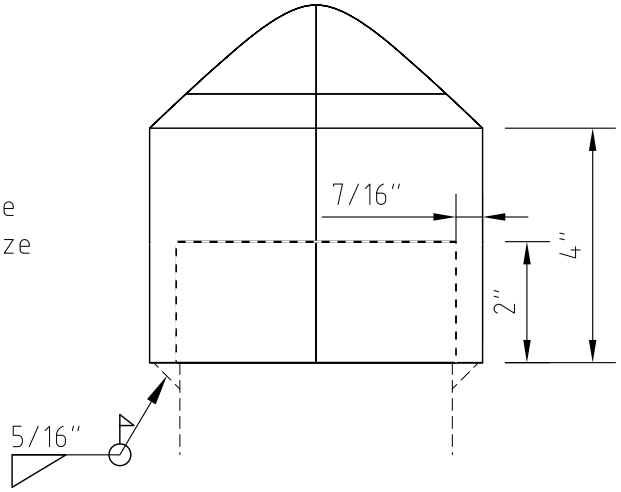
Coping Axon View



002 beam con.

Post Side View





002 beam con.

Coping Side views

A36 Steel tube D.O.M.
5-1/2" OD

Date	Rev	Rev.- Name	Revision

vector foiltec
13 Green Mountain Drive
Cohoes, NY 12047
Phone: 518-783-0575
Fax: 518-783-0474
us@vector-foiltec.com

Drawing	Project status	
Ring Beam Connection Details	PRELIMINARY	
	Scale/ Unit: NTS	Size: letter

Drawn by	Date	Checked by	Project	Drawing No	Rev
kh	10/11/13	cm	US-MT-Billings-Parmly Library	beam con.	

File: B:\05-Project Files\01-active projects\1059-US-MT-Parmly Billings Library Skylight\09 Drawing Source Files\0000-Sketches\SK_2013.10.11 Ring Beam Connection.dwg Dated: 10/11/2013 2:57:42 PM

Remarks

UNITED STATES PARMLY BILLINGS LIBRARY SKYLIGHT
BILLINGS, MONTANA

Weld Calculations for Structural Steel Ring Supports

DATE OF ISSUE: *November 19, 2013*

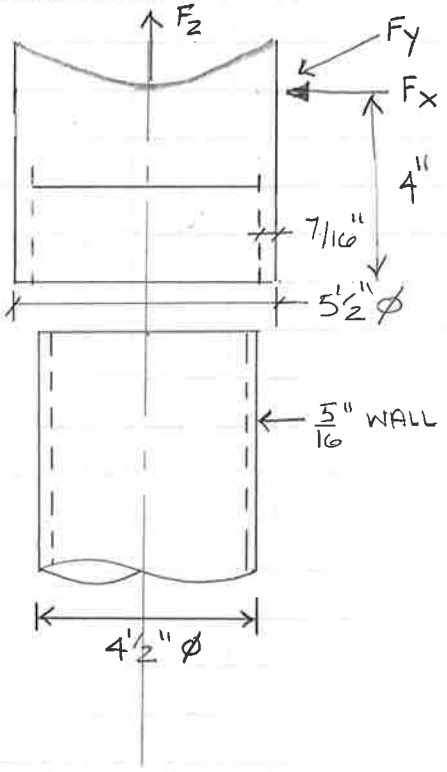
PREPARED FOR: Vector Foiltec
13 Green Mountain Drive
Cohoes, NY 12047

WEIDLINGER

Weidlinger Associates, Inc. • 27 Wormwood Street, 2nd Floor • Boston, MA 02210
Phone 617 374 0000 • Fax 617 374 0010 • www.wai.com

PROJECT	PARMLY LIBRARY	SUBJECT	
BY	JC	DATE	10-24-2013
CHECKED BY		DATE	
		PAGE	1 OF

A. PROVIDE WELD DESIGN FOR POST CONNECTION



TUBE STRENGTH = A36 $F_y = 36^{ksi}$ $F_u = 58^{ksi}$

$A_w = \pi d = 17.3 in$

WELD STRENGTH = $.6F_{exx}$
$= .6(70) = 42^{ksi}$

BASE STRENGTH OF WELD ON STRENGTH OF SMALL TUBE

$F_y A_g = (36ksi)(4.14 in^2) = 149^{kips}$

$\phi F_y A_g = 134^{kips}$

$\phi F_u A_e = .75(58)(.6)(4.14) = \underline{108^{kips}} \Leftarrow$

$\phi R_{nw} = \phi .6F_{exx}(.707) D/16 \, l_w$

$= .75(.6)(70)(.707)\,5/16\,(17.3) = 120.4^{K} \Leftarrow$

USE 5/16" FILLET WELD

NOTE MAX ULTIMATE REACTION PER CALC'S BY GRID ENGINEERS

$F_x = 8.4^{K}$
$F_y = .65^{K}$
$F_z = 37^{K}$

$A_w = \pi d = 14.13 in^2$
$S_w = \pi d^2/4 = 15.9 in^3$

$M = 8.4(4") + .65(4") = 36.2^{k\cdot in}$

$f_R = \sqrt{(2.62 + 2.27^2)^2 + (.64)^2} = 4.93^{K/in}$

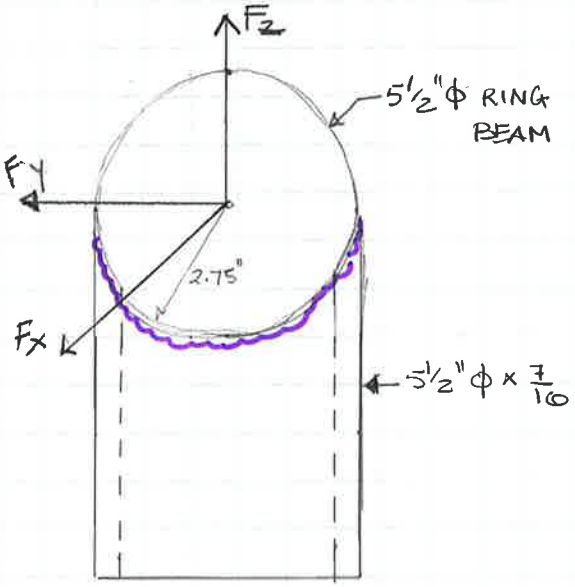
$f_p = 6.96^{K/in}$

PROJECT	PARMLY LIBRARY	SUBJECT	
BY	JC DATE 10-24-2013		
CHECKED BY	DATE	PAGE	2 OF

B. PROVIDE WELD BETWEEN RING AND SUPPORT

PERIMETER RING
ROUND 5½"Ø x 5/16" WALL

POST
5½"Ø x 7/16"



BASE DESIGN OF WELD FROM STRENGTH OF PERIMETER RING

$\phi R_{nw} = \phi .6 F_u A$

$= .75(.6)(58)$

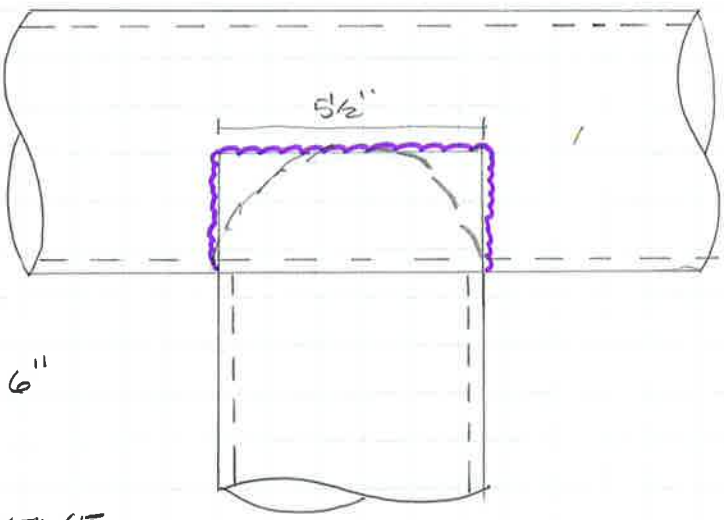
GROVE WELD (PJP)

$\phi R_{nw} = \phi t_e .6 F_{exx} \times l_w$

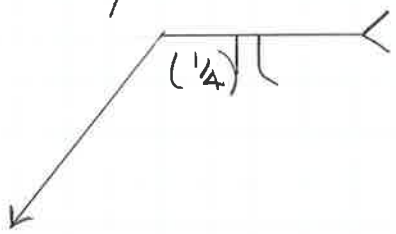
$= .9(1/4)(.6)(70)(19.6)$

$= 185^{kips}$

$l_w = 5\frac{1}{2} \times 2 + \frac{\pi(2.75)}{2} \times 2 \text{ SIDES} = 19.6"$



USE PJP GROVE WELD W/ EFFECTIVE THROAT = ¼"



APPENDIX

VECTOR FOILTEC CALCULATIONS [NOT BY WEIDLINGER ASSOCIATES, INC.]

(USED FOR REFERENCE ONLY)

Structural Calculation
Texlon Cushions &
Steel Structure

Project: USA - Parmly Billings Library - Billings MT

Subject: **Texlon Skylight**
ETFE, Extrusion and Steel Joints
- Revision with new structure -

Volume of this structural calculation: pages 1 to 26 and annexes A, B, C

D-Bremen, August 14, 2013

vector foiltec

vector foiltec GmbH
Steinacker 3 · D-28717 Bremen
Telefon +49-(0)-421-69351-0
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Introduction and Basics

Item

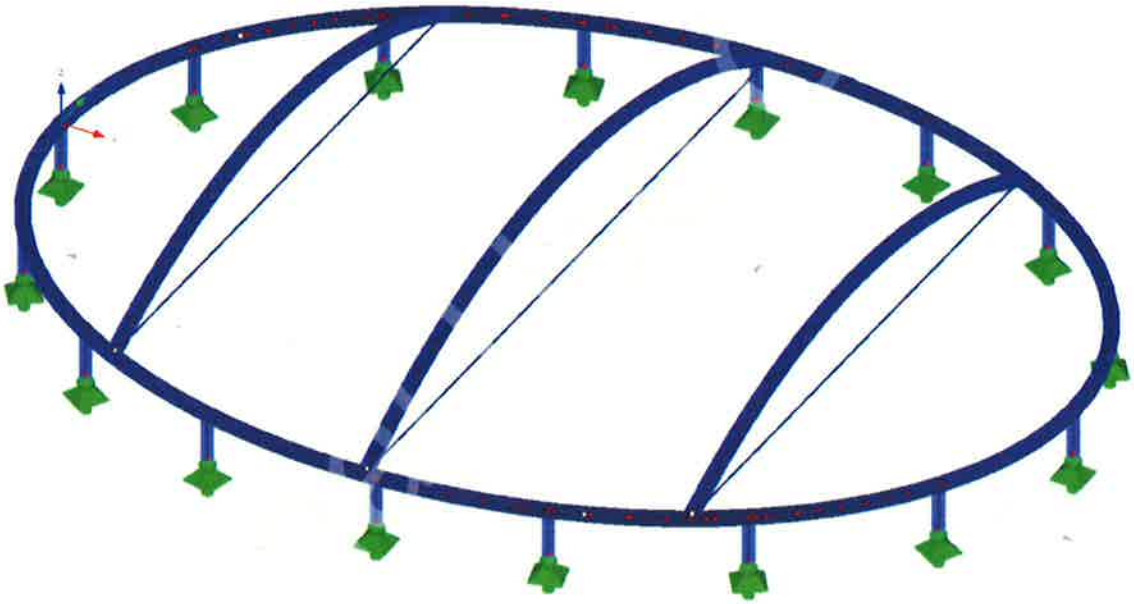
A skylight, made of ETFE cushion membran structure and structural steel, is subject of this structural anlysis. The membran cushions and structural steel members are statically proved. Elements of primary structure are not subject and have to be designed by someone else.

Dimensions of the oval plan view are

a = 32 * 0,3048 = 9,754 m

b = 24 * 0,3048 = 7,315 m

Area = $\pi * a * \frac{b}{4}$ = 56,0 m²



Parts of the structural calculation

A new structural concept is analysed in this revision.

It substitutes all former parts from Dec. 2012/Jan. 2013

Part 1 - Structural steel design

Part 2 - ETFE membrane

Part 3 - Extrusion and steel joints

Revisions

Rev.	Date	Remarks
0	10-08-2013	Structural system switched to 3 parallel Arches

Basics

[1] construction documents of May 01,2012:
- a0.4 - code/occupancy plans
- s2.2 - level 2 framing plan
- s2.3 - roof framing plan
- s6.1 - roof framing details
- a7.9 - exterior details

by will bruder + Partners LTD, 2524 North 24. th Street, Phoenix, Arizona 85008, USA

[2] drawing 1059_3000: General Arrangement, Steel Structure, Positioning of ring beam + columns (November 16, 2012) vector foiltec GmbH, Steinacker 3, D-28717 Bremen (vector foiltec llc, 13 Green Mountain Drive, Cohoes, NY 12047, USA)

[3] ASCE Standard 7-05: Minimun Design Loads for Buildings and othher structures

[4] EN 1993-1-1 (2005): Design of steel structures - Part 1-1: General rules and rules for buildings

[5] EN 1993-1-8 (2010): Design of steel structures - Part 1-8: Design of joints

[6] EN 1990-0 (2002): Basis of structural design

conversion parameters

onePSF = 0,04788 kN/m²
one_ksi = 6,895 N/mm²

Material

structural steel members

Grade S355 J2H

youngs modulus E = 210000 N/mm²
E_{US} = E / 6,895 = 30456,9 ksi
yield strength f_y = 355 N/mm²
$f_{y,US}$ = f_y / 6,895 = 51,49 ksi
ultimate strength fu = 510 N/mm²
$f_{u,US}$ = f_u / 6,895 = 73,97 ksi
if not mentioned otherwise

Notes on Structural Analysises (Annex A - C)

Annex A

ETFE stress check under downward loads

Loads: Self weight + snow load 30 psf

net clearance ... e = 0,30 m

uniform load... s = 30 * onePSF = 1,436 kN/m²

element load... se = s * e/2 = 0,215 kN/m

Design:

upper layer ≥ 200 µm, initial camber 6%

middle layer ≥ 100 µm

bottom layer ≥ 200 µm, initial camber 6%

Stress Check:

received internal stress ... σ = 12,15 N/mm²

allowable stress... σallow = 12,00 N/mm²

degree of utilisation... η = σ / σallow = 1,01 ≅ 1

Annex B

ETFE and arched steel girder stress check under lifting loads

Loads: Self weight + wind load load 20,4 psf

net clearance ... e = 0,30 m

uniform load... w = 20,4 * onePSF = 0,977 kN/m²

element load... we = w * e/2 = 0,147 kN/m

Design:

upper layer ≥ 200 µm, initial camber 6%

Stress Check (stresses received from an analysis with 3% initial camber):

received internal stress ... σ = 17,80 N/mm²

allowable stress... σallow = 18,00 N/mm²

degree of utilisation... η = σ / σallow = 0,99 ≤ 1

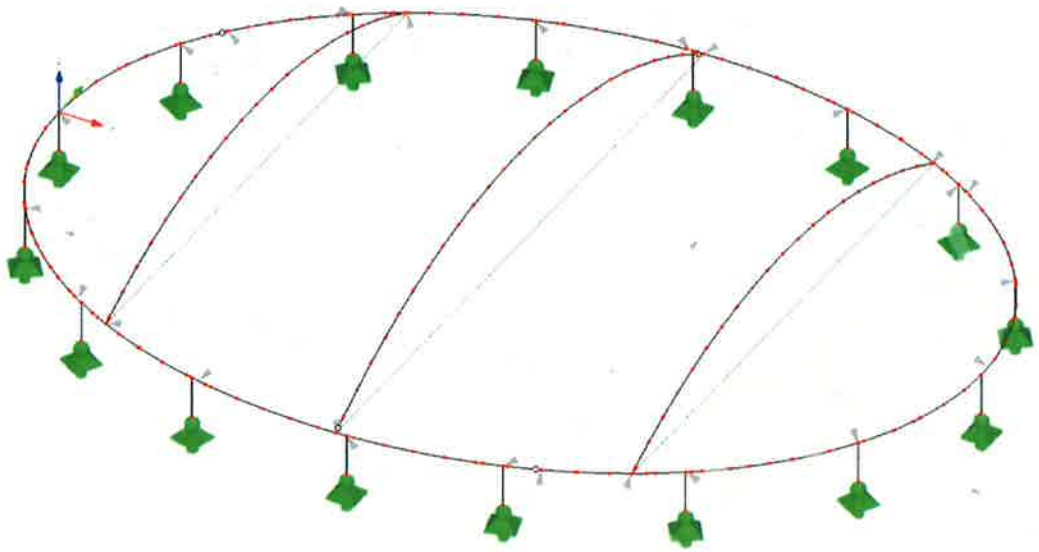
Annex C

Steel structure stress check under downward loads

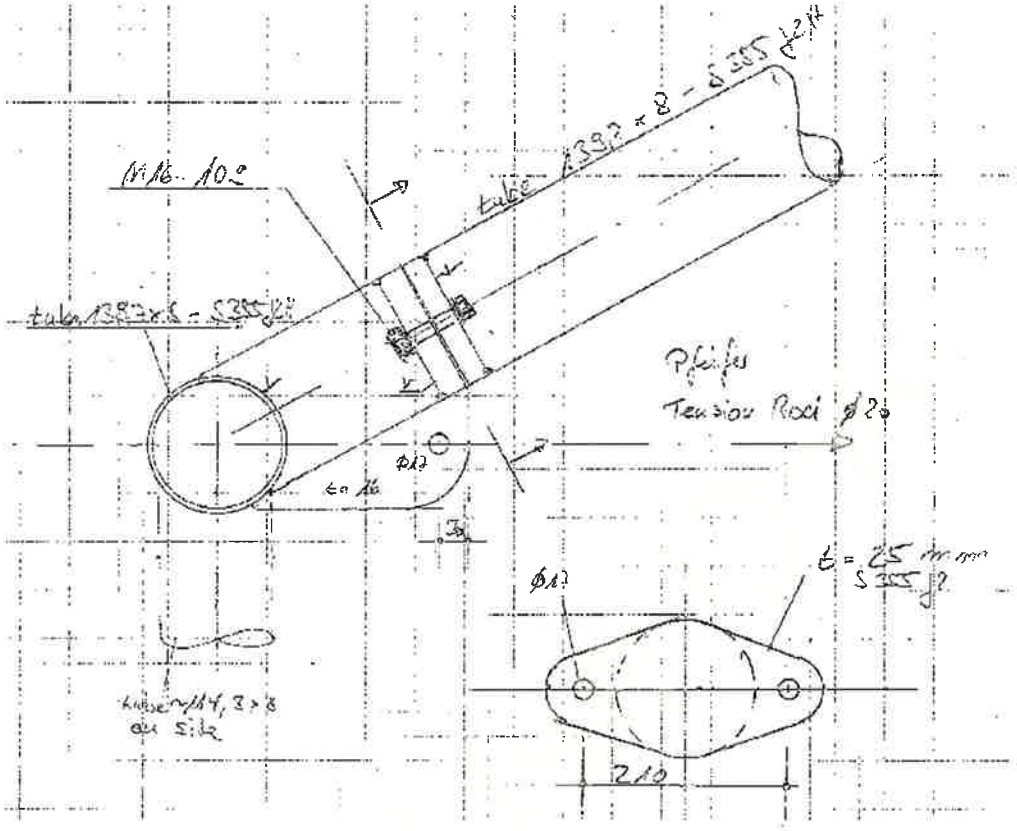
SPANNUNGEN QUERSCHNITTSWEISE

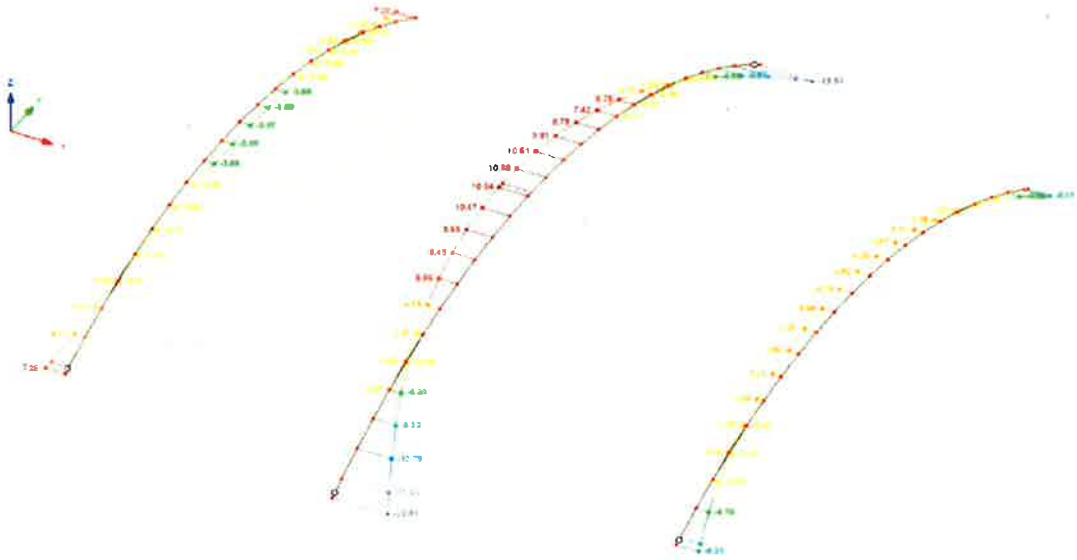
Quer.-Nr.	Stab Nr.	x-Stelle [mm]	S-Punkt Nr.	Last-fall	Spannungsart	Spannung [N/mm²] vorh	grenz	Aus-nutzung
2	**RO 114.3x8 - Column**							
	495	451.9	26	LG11	Sigma gesamt	-115.523	218.182	0.53
	495	0.0	17	LG11	Tau gesamt	12.053	125.967	0.10
	495	451.9	26	LG11	Sigma-v	115.527	218.182	0.53
5	**RO 139.7x8 - Ringbeam**							
	789	0.0	4	LG13	Sigma gesamt	-113.618	327.273	0.35
	1118	70.2	21	LG11	Tau gesamt	25.858	188.951	0.14
	789	0.0	4	LG13	Sigma-v	114.706	327.273	0.35
6	**RO 139.7x8 - Archbeams**							
	815	0.0	19	LG13	Sigma gesamt	-214.734	327.273	0.66
	809	0.0	11	LG13	Tau gesamt	-17.908	188.951	0.09
	815	0.0	19	LG13	Sigma-v	214.798	327.273	0.66
7	**Rundstahl 20 - Rod**							
	817	7200.9	37	LG11	Sigma gesamt	172.190	327.273	0.53
	296	0.0	1	LG3	Tau gesamt	0.000	188.951	0.00
	817	7200.9	37	LG11	Sigma-v	172.190	327.273	0.53

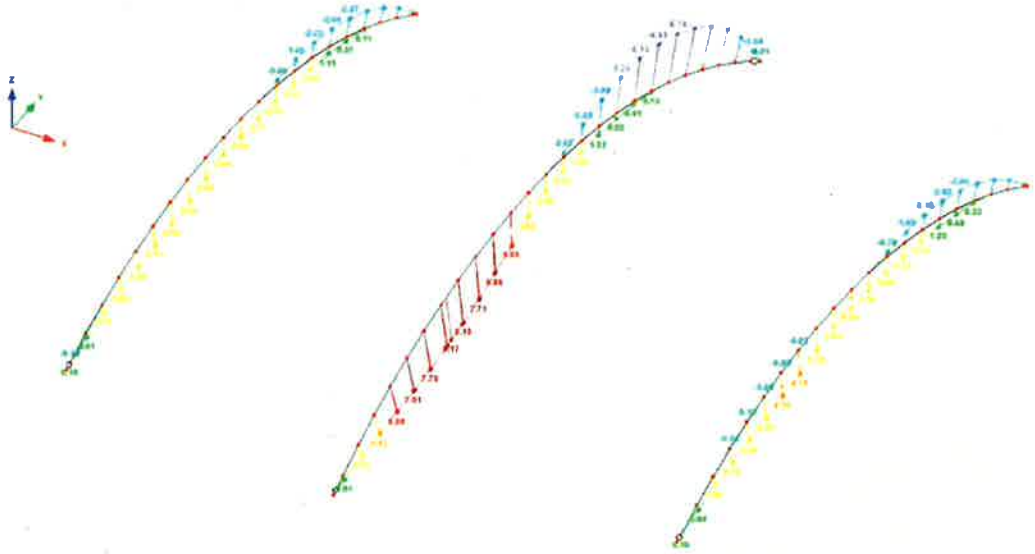
Steel Joints and Aluminium Extrusion



Pos. 31 T-Joint Arches to Eaves Ring







Rating forces

min N_{Ed} = −68 kN

V_{yEd} = 49,0 kN

V_{zEd} = 7,40 kN

M_{zEd} = 3,1 kNm

M_{yEd} = 0,0 kNm

n_{zEd} = 20,81 kN/m

Schraubenverbindungen (Bolted joints)

$V_{zEdi} = \frac{3,10}{24} + \frac{7,4}{2} = 16,62$ kN

$V_{yEdi} = 19,0/2 = 9,5$ kN

$V_{Edi} = \sqrt{16,6^2 + 9,5^2} = 19,2$ kN

$F_t = 20,81 \cdot 7,1 = 99,1$ kN

gew. M16 – 10.9

$F_t / F_{tRd} = \frac{99,1}{113} = 0,88 < 1$

$V_{Edi} / F_{vRd} = \frac{19,2}{62,8} = 0,3 < 1$

$0,3 + \frac{0,88}{1,4} = 0,93 < 1$

Stirnplatte (End Plate)

$M = 99{,}75 \times 4{,}0 = 399$ kNcm

$h = 11$ cm

$t = 2{,}5$

$W = 11 \cdot 2{,}5^2/4 = 17{,}2$

$387/17{,}2 = 23{,}10$ kN/cm²

$23{,}1/35{,}5 = 0{,}65 < 1$

Welded tube joint

(according to DIN EN 1993-1-8: 2010-12)

Einwirkungen (Acting Forces and Bending Moments)

Strebe (Brace) Column Member No. 327

$N_{1,Ed}$ = **-68,00 kN**

in-plane $M_{ip,1,Ed}$ = **20,81 kNm**

out-of-plane $M_{op,1,Ed}$ = **0,00 kNm**

Gurtstab (Chord) Eaves Ring Member No. 292

$N_{0,Ed}$ = **-14,70 kN**

pressure > 0.... $N_{p,Ed}$ = $-N_{0,Ed}$ = 14,70 kN

in-plane $M_{ip,0,Ed}$ = **11,20 kNm**

out-of-plane $M_{op,0,Ed}$ = **9,00 kNm**

Geometrie (geometry)

$a_w = t_1$

Θ_1 = **90,00 °**

partial safety factor according to Eurocode γ_{M5} = **1,00**

Strebe (brace)

f_{y1} = fy/10 = **35,50 kN/cm²**

d_1 = **139,7** /10 = 13,97 cm

t_1 = **8,0** /10 = 0,80 cm

Gurtstab (chord)

f_{y0} = fy/10 = **35,50 kN/cm²**

d_0 = **139,7** /10 = 13,97 cm

t_0 = **8** /10 = 0,80 cm

A_0 = $\pi/4*(d_0^2-(d_0-2*t_0)^2)$ = 33,10 cm²

$W_{el,0}$ = $\pi/(32*d_0)*(d_0^4-(d_0-2*t_0)^4)$ = 103,12 cm³

Gurtspannung (Chord Stress) pressure > 0, tension < 0

$$\sigma_{p,Ed} = \frac{N_{p,Ed}}{A_0} + \frac{\sqrt{\left(M_{ip,0,Ed}^{\ 2} + M_{op,0,Ed}^{\ 2}\right)} \times 10^2}{W_{el,0}} = 14{,}38 \text{ kN/cm}^2$$

Parameter und Beiwerte (Coefficients):

β = d_1 / d_0 = 1,00

γ = $d_0 / (2 * t_0)$ = 8,73

pressure >0!... n_p = $\sigma_{p,Ed} / f_{y0} * \gamma_{M5}$ = 0,405

k_p = MIN(1-0,3*n_p*(1+n_p);1,0) = 0,829

k_p = WENN(np < 0;1,0;k_p) = 0,829

Gültigkeitsbereich nach Tab. 7.1 (Scope according to Eurocode table 7.1):

Durchmesserverhältnis = d_1 / d_0 = **1,0 (≤1,0 und ≥ 0,2)**

(diameter ratio)

Gurtstäbe Zug = d_0 / t_0 = **17,5 (≤ 50 und ≥ 10)**

(chord in tension)

Gurtstäbe Druck = d_0 / t_0 = **17,5 (≤ 50 und ≥ 10 sowie Klasse 1 oder 2)**

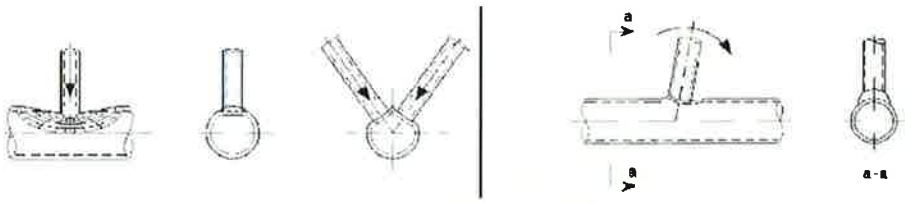
(chord in pressure, needs to be class 1 or 2 section ⇒ plastic design possible)

Streben Zug = d_1 / t_1 = **17,5 (≤ 50)**

(brace in tension)

Streben Druck (brace in pressure) **Klasse 1 oder 2 (class 1 or 2)**

Flanschversagen des Gurtstabes (flange failure of the chord)



$$N_{1,Rd,a} = \frac{\gamma^{0,2} * k_p * f_{y0} * t_0^2}{\sin(\Theta_1)} * (2,8 + 14,2 * \beta^2) / \gamma_{M5} = 494 \text{ kN}$$

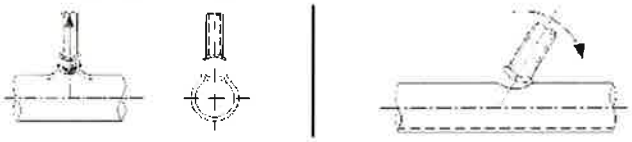
$$M_{ip,1,Rd,a} = 4,85 * \frac{f_{y0} * t_0^2 * d_1}{\sin(\Theta_1)} * \sqrt{\gamma} * \beta * k_p / \gamma_{M5} * 10^{-2} = 37,71 \text{ kNm}$$

$$M_{op,1,Rd,a} = \frac{f_{y0} * t_0^2 * d_1}{\sin(\Theta_1)} * \frac{2,7}{1 - 0,81 * \beta} * k_p / \gamma_{M5} * 10^{-2} = 37,39 \text{ kNm}$$

Durchstanzen der Wandung des Gurtstabes (punching shear)

nur bei (only to be considered if) $d_1 \le d_0 - 2 * t_0$

η = $d_1 / (d_0 - 2 * t_0)$ = **1,13 ≤ 1**



$$N_{1,Rd,d} = \text{WENN}(\eta \le 1; \frac{f_{y0}}{\sqrt{3}} * t_0 * \pi * d_1 * \frac{1 + \sin(\Theta_1)}{2 * (\sin(\Theta_1))^2} * \frac{1}{\gamma_{M5}}; N1,Rd,a) = 494,00 \text{ kN}$$

$$M_{ip,1,Rd,d} = \text{WENN}(\eta \le 1; \frac{f_{y0} * t_0 * d_1^2}{\sqrt{3}} * \frac{1 + 3 * \sin(\Theta_1)}{4 * (\sin(\Theta_1))^2} / \gamma_{M5} * 10^{-2}; Mip,1,Rd,a) = 37,71 \text{ kNm}$$

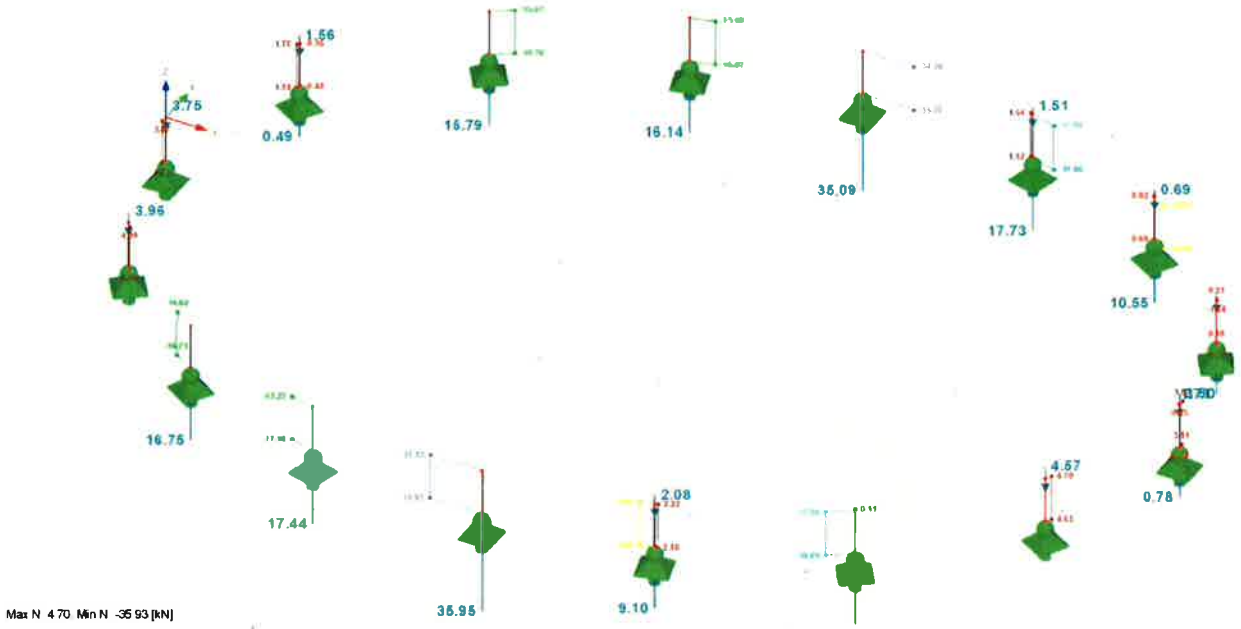
$$M_{op,1,Rd,d} = \text{WENN}(\eta \le 1; f_{y0} * t_0 * \frac{d_1^2}{\sqrt{3}} * \frac{3 + \sin(\Theta_1)}{4 * (\sin(\Theta_1))^2} * \frac{1}{\gamma_{M5} * 10^2}; Mop,1,Rd,a) = 37,39 \text{ kNm}$$

Nachweis (Degree of Utilisation)

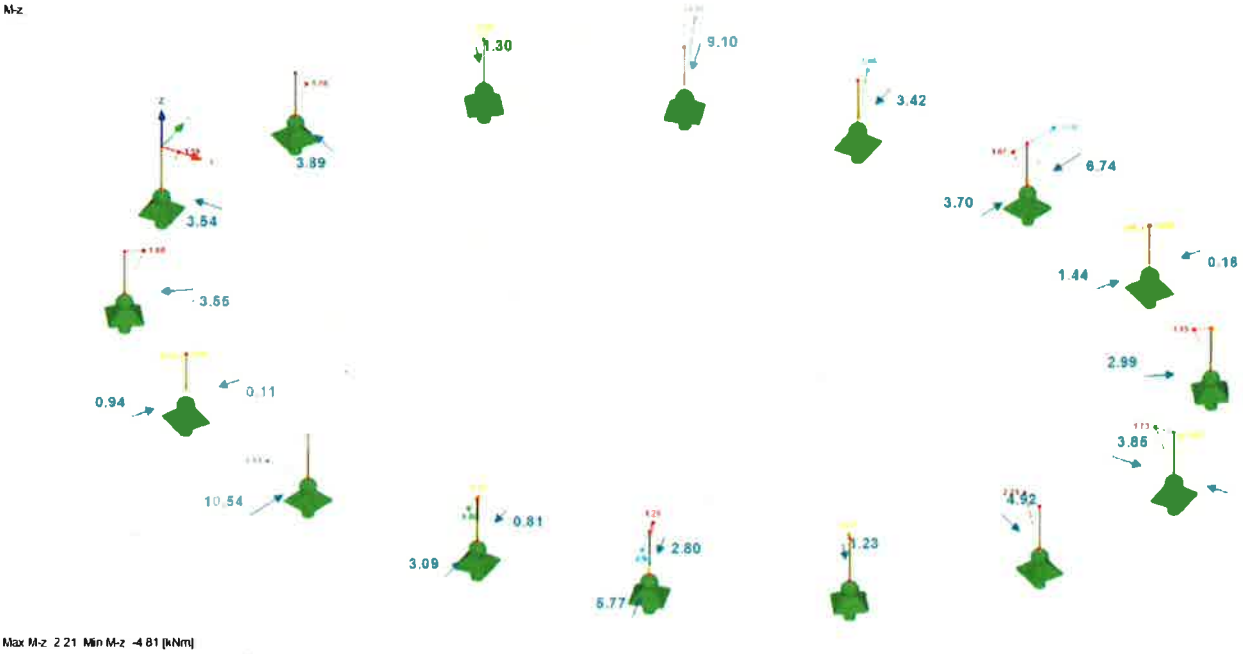
Normalkraft η_N =	$ABS(N_{1,Ed})/MIN(N_{1,Rd,a};N_{1,Rd,d})$	=	0,14 < 1,0
Moment in-plane η_{ip} =	$M_{ip,1,Ed}/MIN(M_{ip,1,Rd,a};M_{ip,1,Rd,d})$	=	0,55 < 1,0
Moment out-plane η_{op} =	$M_{op,1,Ed}/MIN(M_{op,1,Rd,a};M_{op,1,Rd,d})$	=	0,00 < 1
Interaktion η =	$\eta_N+\eta_{ip}^2+\eta_{op}$	=	0,44 < 1

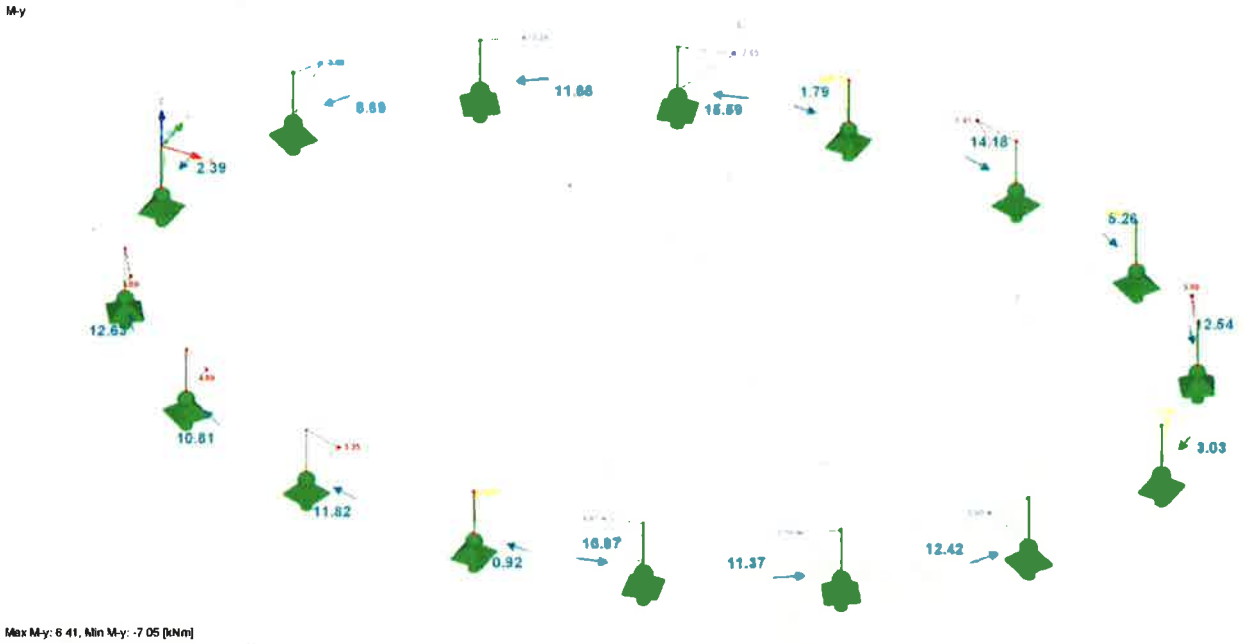
Pos. 32 T-Joint Column to Eaves Ring

(according to DIN EN 1993-1-8: 2010-12)



M-z





Einwirkungen (Acting Forces and Bending Moments)

Strebe (Brace) internal forces worst of column members no. 329, 332

$N_{1,Ed}$ = **-36,00 kN**

in-plane $M_{ip,1,Ed}$ = **7,05 kNm**

out-of-plane $M_{op,1,Ed}$ = **4,81 kNm**

Gurtstab (Chord) eaves ring members no. 166 and 13

$N_{0,Ed}$ = **-16,30 kN**

pressure > 0.... $N_{p,Ed}$ = $-N_{0,Ed}$ = 16,30 kN

in-plane $M_{ip,0,Ed}$ = **8,70 kNm**

out-of-plane $M_{op,0,Ed}$ = **10,19 kNm**

Geometrie (Geometry)

$a_w = t_1$

Θ_1 = **90,00 °**

γ_{M5} = **1,00**

Strebe (Brace)

f_{y1} = 241/10 = **24,10 kN/cm²**

d_1 = **114,3** /10 = 11,43 cm

t_1 = **17,2** /10 = 1,72 cm

Gurtstab (Chord)

f_{y0} = fy/10 = **35,50 kN/cm²**

d_0 = **139,7** /10 = 13,97 cm

t_0 = **8** /10 = 0,80 cm

A_0 = $\pi/4*(d_0^2-(d_0-2*t_0)^2)$ = 33,10 cm²

$W_{el,0}$ = $\pi/(32*d_0)*(d_0^4-(d_0-2*t_0)^4)$ = 103,12 cm³

Gurtspannung (Stress in chord, pressure with pos. algebraic sign):

$$\sigma_{p,Ed} = \frac{N_{p,Ed}}{A_0} + \frac{\sqrt{\left(M_{ip,0,Ed}^{\ 2} + M_{op,0,Ed}^{\ 2}\right)} \times 10^2}{W_{el,0}} = 13{,}49 \text{ kN/cm}^2$$

Parameter und Beiwerte (Coefficients):

β = d_1 / d_0 = 0,82

γ = $d_0 / (2 * t_0)$ = 8,73

pressure >0!... n_p = $\sigma_{p,Ed} / f_{y0} * \gamma_{M5}$ = 0,380

k_p = MIN(1-0,3*n_p*(1+n_p);1,0) = 0,843

k_p = WENN(np < 0;1,0;k_p) = 0,843

Gültigkeitsbereich nach Tab. 7.1 (Scope according to Eurocode table 7.1):

Durchmesserverhältnis = d_1 / d_0 = **0,8 (≤1,0 und ≥ 0,2)**

(diameter ratio)

Gurtstäbe Zug = d_0 / t_0 = **17,5 (≤ 50 und ≥ 10)**

(chord in tension)

Gurtstäbe Druck = d_0 / t_0 = **17,5 (≤ 50 und ≥ 10 sowie Klasse 1 oder 2)**

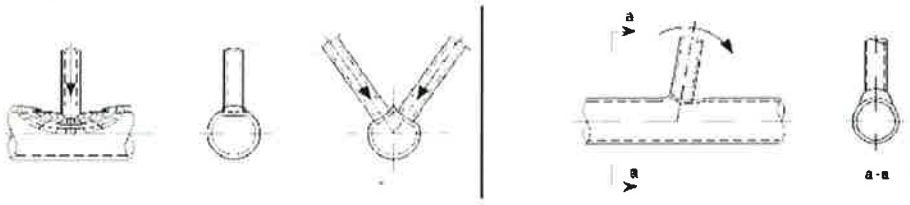
(chord in pressure, needs to be class 1 or 2 section ⇒ plastic design possible)

Streben Zug = d_1 / t_1 = **6,6 (≤ 50)**

(brace in tension)

Streben Druck (brace in pressure) **Klasse 1 oder 2 (class 1 or 2)**

Flanschversagen des Gurtstabes (Flange Failure of the Chord)



$$N_{1,Rd,a} = \frac{\gamma^{0,2} * k_p * f_{y0} * t_0^{\ 2}}{\sin(\Theta_1)} * (2{,}8 + 14{,}2 * \beta^2) / \gamma_{M5} = 365 \text{ kN}$$

$$M_{ip,1,Rd,a} = 4{,}85 * \frac{f_{y0} * t_0^{\ 2} * d_1}{\sin(\Theta_1)} * \sqrt{\gamma} * \beta * k_p / \gamma_{M5} * 10^{-2} = 25{,}72 \text{ kNm}$$

$$M_{op,1,Rd,a} = \frac{f_{y0} * t_0^{\,2} * d_1}{\sin(\Theta_1)} * \frac{2,7}{1 - 0,81 * \beta} * k_p / \gamma_{M5} * 10^{-2} = 17,60 \text{ kNm}$$

Durchstanzen der Wandung des Gurtstabes (Punching Shear)

only to be considered if $d_1 \le d_0 - 2 * t_0$

$\eta = d_1 / (d_0 - 2 * t_0) = \mathbf{0,92 \le 1}$

$$N_{1,Rd,d} = \text{WENN}(\eta \le 1; \frac{f_{y0}}{\sqrt{3}} * t_0 * \pi * d_1 * \frac{1 + \sin(\Theta_1)}{2 * (\sin(\Theta_1))^2} * \frac{1}{\gamma_{M5}}; 0) = 588,78 \text{ kN}$$

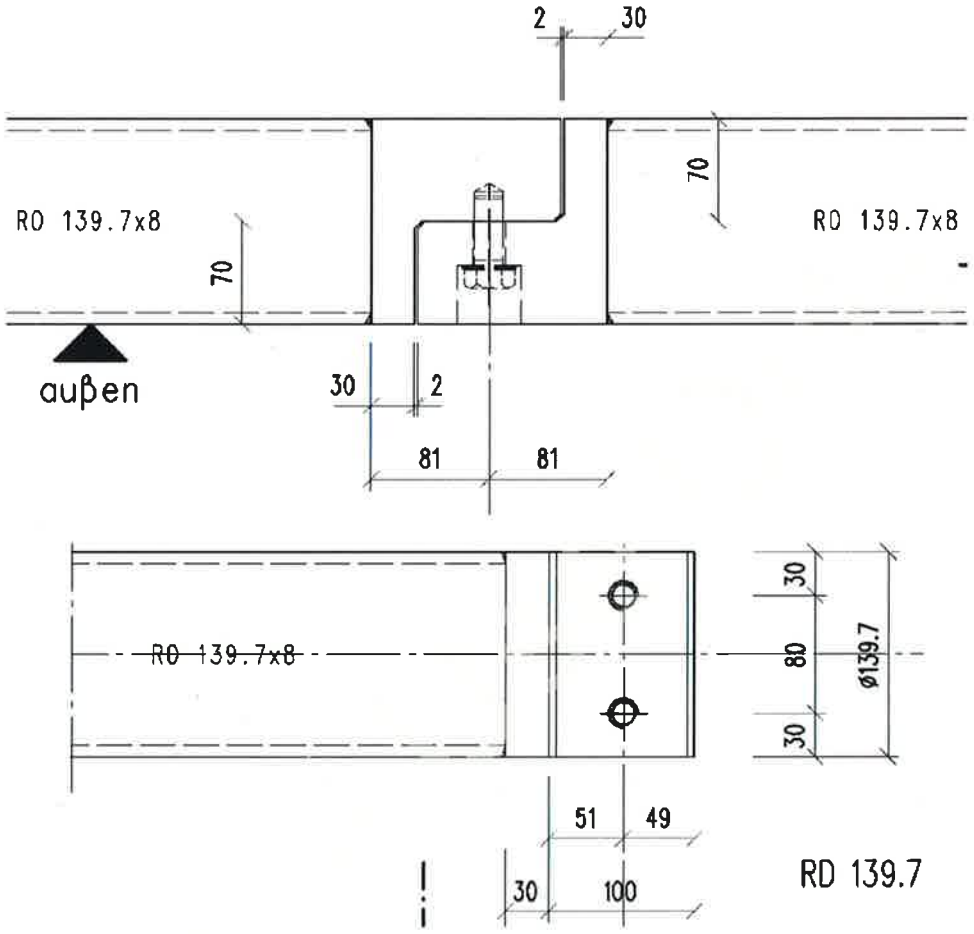
$$M_{ip,1,Rd,d} = \text{WENN}(\eta \le 1; \frac{f_{y0} * t_0 * d_1^{\,2}}{\sqrt{3}} * \frac{1 + 3 * \sin(\Theta_1)}{4 * (\sin(\Theta_1))^2} / \gamma_{M5} * 10^{-2}; 0) = 21,42 \text{ kNm}$$

$$M_{op,1,Rd,d} = \text{WENN}(\eta \le 1; f_{y0} * t_0 * \frac{d_1^{\,2}}{\sqrt{3}} * \frac{3 + \sin(\Theta_1)}{4 * (\sin(\Theta_1))^2} * \frac{1}{\gamma_{M5} * 10^2}; 0) = 21,42 \text{ kNm}$$

Nachweis (Degree of Utilisation)

Normal Force η_N =	$\text{ABS}(N_{1,Ed})/\text{MIN}(N_{1,Rd,a};N_{1,Rd,d})$	= **0,10 < 1,0**
Moment in-plane η_{ip} =	$M_{ip,1,Ed}/\text{MIN}(M_{ip,1,Rd,a};M_{ip,1,Rd,d})$	= **0,33 < 1,0**
Moment out-plane η_{op} =	$M_{op,1,Ed}/\text{MIN}(M_{op,1,Rd,a};M_{op,1,Rd,d})$	= **0,27 < 1,0**
Interaction η =	$\eta_N+\eta_{ip}^{\,2}+\eta_{op}$	= **0,48 < 1**

Pos. 33 Bolted Joints within the Eaves Ring



Geometry

section diameter... d0 = 139,7 mm

section wall thickness... t0 = 8,0 mm

joint plate thickness... tp = 30,0 mm

ultimate strength.. fu = 510 N/mm²

bolt diameter... db = 20,0 mm

grade 10.9... fub = 1000 N/mm²

design tension resistance... FtRd = 176,0 kN

design shear resistance... FvRd = 98,0 kN

(tread in the shear surface!)

gap between the bolts... eb = 80,0 mm

design punsch resistance BpRd = 248 * tp/10 = 744,0 kN

(248 kN acc. to a table for M20-10.9, 10 mm plate -S355)

bolt hole diameter... dh = db + 2 = 22 mm

partial material safety factor... $\gamma M0$ = 1,00

partial connection safety factor... $\gamma M2$ = 1,25

Acting Internal Forces

LG3, eaves ring members no. 309 + 312, see annex A

pressure force... NEd = 16,30 kN

horizontal shear force.. VyEd = 5,26 kN

vertical shear force... VzEd = 10,87 kN

torsional moment... TEd = 3,14 kNm

forces acting on one bolt

FvEd = $\sqrt{(VzEd^2 + NEd^2)}/2$ = 9,8 kN

FtEd = 0,5*VyEd + 1000*TEd / eb = 41,9 kN

Degree of Utilization

ηv = FvEd / FvRd = 0,10 ≤ 1

ηt = FtEd / FtRd = 0,24 ≤ 1

η = $\eta v + \eta t/1,4$ = 0,27 ≤ 1

ηp = FtEd/BpRd = 0,06 ≤ 1

specific pressure on hole

edge distance lontigutinal to force... e1 = 30 mm

bolt gap transversal to force... e2 = 30 mm

bolt gap longitudinal to force... p2 = eb*COS(0) = 80 mm

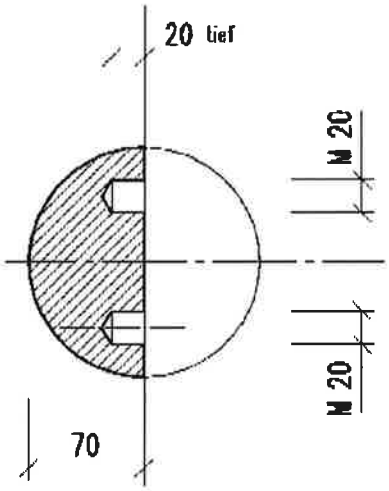
αb = MIN(e1/(3*dh); fub/fu; 1,0) = 0,455

k1 = MIN(2,8*e2/dh-1,7; 1,4*p2/db-1,7; 2,5) = 2,118

FbRd = k1 * αb * fu * db * tp / $\gamma M2$ / 1000 = 235,91 kN

η = FvEd / FbRd = 0,04 ≤ 1

Half Section



fys = 335,0 / 10 = 33,50 kN/cm²

shear + torsional moment

$r = \frac{d0}{2}$ = 69,85 mm

$t_{notional}$ = 5,00 mm

Am = 0,5 * π * (r-0,5*$t_{notional}$)² ₹125 mm2

⇒ WT = 2 * Am * $t_{notional}$ / 1000 = 71,25 cm³

$\tau T = 100 * \frac{TEd}{WT}$ = 4,41 kN/cm²

τv = 1,5 * MAX(VyEd; VzEd) / Am = 0,002 kN/cm²

τEd = τT + τv = 4,41 kN/cm²

τRd = fys / (γM0 * √(3)) = 19,34 kN/cm²

η = τEd / τRd = 0,23 ≤ 1

Tension and Bending

ri = r - $t_{notional}$ = 64,85 mm

$A = 0,5 * \pi * \frac{ri^2}{100}$ = 66,06 cm²

$Wo = 0,191 * \frac{ri^3}{1000}$ = 52,09 cm³

My = VyEd * 8,1 = 42,61 kNcm

$Wz = \frac{1}{8} * \frac{ri^3}{1000}$ = 34,09 cm3

Mz = VzEd * 8,1 = 88,05 kNcm

$$\sigma d = \frac{NEd}{A} + \frac{My}{Wo} + \frac{Mz}{Wz} = 3{,}65 \text{ kN/cm}^2$$

$$\eta = \sigma d / (fys/\gamma M0) = 0{,}11 < 1$$

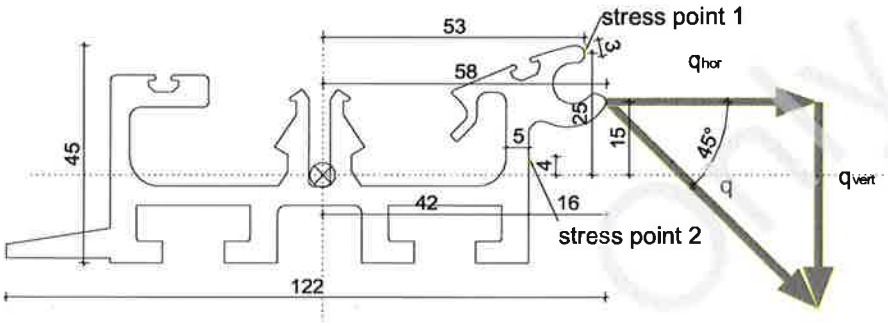
Pos. 34 skipped

Pos. 35 skipped

Pos. 36 Extrusion - F16.2

System

max. clearance between upstands e_{up} = **100,0 cm**



load eccentrity e_y = **5,80 cm**

load eccentrity e_z = **1,50 cm**

Material

Aluminium AW-6060 T66
acc. to EN 1999-1-1:2010

0,2% offset yield strength $f_{o,alu}$=			**15,00 kN/cm²**
tensile strength $f_{u,alu}$=			**19,50 kN/cm²**
young' modulus E_{alu}=			**70000,0 N/mm²**
shear modulus G_{alu}=			**27000,0 N/mm²**
material safety factor $\gamma_{M1,alu}$=			**1,10**
yield strength $f_{alu,d}$=	$f_{o,alu} / \gamma_{M1,alu}$	=	**13,64 kN/cm²**

Loads

Determination of loads from the ultimate strength of the membrane layers

partial load safety factor... γF = 1,50

sum layer thicknesses t_m = **0,20+0,20** = 0,40 mm
(middle + bottom layer, see part 2)

allowable stress f_{all} = **12,0 N/mm²**

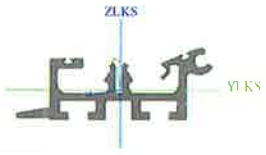
max. slope of lower layer... α = **45,0 °**

tensile force per meter... q_d =	$\gamma F * t_m * f_{all}$	=	7,20 kN/m
horizontal force $q_{hor,d}$ =	$q_d * COS(\alpha)$	=	5,09 kN/m
vertical force $q_{vert,d}$ =	$q_d * SIN(\alpha)$	=	5,09 kN/m

Note:
Maximum stresses of 12,0 N/mm² are relevant for long term load. In general these loads are acting on two layers (i. e. snow load). The subsequently used load "q" covers the maximum tensile membrane force of 12,0 N/mm² x 0,4 mm = 4,80 N/mm for snow load and 18,0 N/mm² x 0,2 mm = 3,6 kN/m or wind load acting on the upper layer.

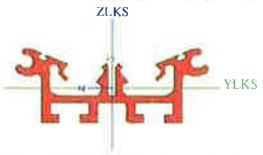
Cross section

Name	F16.2 Single	
Typ	Allgemeiner Querschnitt	
Materialangabe	S 235	
Herstellung	allgemein	
Knick y-y, z-z	c	c
FEM-Analyse	✓	



A [cm²]	14,61	
A y, z [cm²]	1,04	3,48
I y, z [cm⁴]	160,89	19,30
I YLCS, ZLCS [cm⁴]	21,64	158,55
I w [cm⁶], t [cm⁴]	280,71	1,23
Wel y, z [cm³]	24,26	7,47
Wpl y, z [cm³]	42,09	13,96
d y, z [mm]	-9,89	3,17
c YLKS, ZLKS [mm]	3,62	-4,24
Alpha [deg]	97,39	
IYZLKS [cm⁴]	18,06	
AL [m²/m]	0,65	
Mply +, - [Ncm]	1,01e+06	1,01e+06
Mplz +, - [Ncm]	3,35e+05	3,35e+05

Name	F16.2 Double	
Typ	Allgemeiner Querschnitt	
Materialangabe	S 235	
Herstellung	allgemein	
Knick y-y, z-z	c	c
FEM-Analyse	✓	



A [cm²]	14,87	
A y, z [cm²]	2,82	5,15
I y, z [cm⁴]	164,88	22,27
I YLCS, ZLCS [cm⁴]	22,27	164,88
I w [cm⁶], t [cm⁴]	241,98	1,24
Wel y, z [cm³]	28,25	9,12
Wpl y, z [cm³]	43,44	15,90
d y, z [mm]	-15,75	0,00
c YLKS, ZLKS [mm]	0,00	-1,96
Alpha [deg]	90,00	
IYZLKS [cm⁴]	0,00	
AL [m²/m]	0,67	
Mply +, - [Ncm]	1,04e+06	1,04e+06
Mplz +, - [Ncm]	3,82e+05	3,82e+05

⇒ values for extrusion type "F16.2 single" will be used

I_y = **21,64 cm⁴**
I_z = **158,55 cm⁴**
I_t = **1,23 cm⁴**

design

double-span beam:

$M_{y,d} = q_{vert,d} * e_{up}^2 * 1/8 / 100 = 63,6$ kNcm
$M_{z,d} = q_{hor,d} * e_{up}^2 * 1/8 / 100 = 63,6$ kNcm
$M_{t,d} = (q_{hor,d} * e_z + q_{vert,d} * e_y) * e_{up}/2 /100 = 18,6$ kNcm

stress point 1

$W_y = I_y$ / **2,50** = 8,7 cm³
$W_z = I_z$ / **5,30** = 29,9 cm³
$W_t = I_t$ / **0,30** = 4,1 cm³

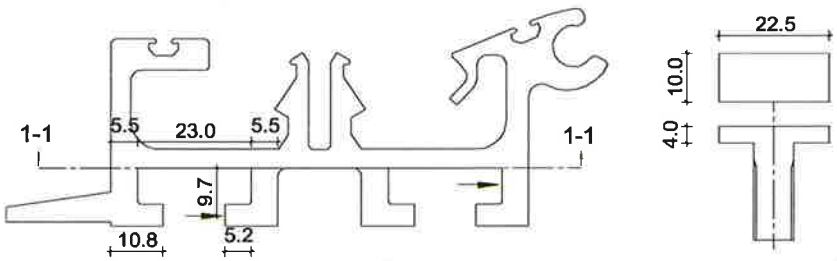
σ_d = $M_{y,d} / W_y + M_{z,d}/W_z$ = 9,4 kN/cm²
τ_d = $M_{t,d} / W_t$ = 4,5 kN/cm²
v. Mises σ_v = $\sqrt{(\sigma_d^2 + 3 * \tau_d^2)}$ = 12,2 kN/cm²
coeff. of utilization η = $\sigma_v / f_{alu,d}$ = **0,89 ≤ 1**

stress point 2

$W_y = I_y$ / **0,40** = 54,1 cm³
$W_z = I_z$ / **4,20** = 37,8 cm³
$W_t = I_t$ / **0,50** = 2,5 cm³

$\sigma_{x,d}$ = $M_{y,d} / W_y + M_{z,d}/W_z$ = 2,86 kN/cm²
$\sigma_{z,d}$ = $qv_{ert,d}/(0,5*100) + (q_{hor,d} * \mathbf{1,50} + q_{vert,d} * \mathbf{1,6}) / 100 / (0,50^2/6)$ = 3,89 kN/cm²
τ_d = $0,5*q_{vert,d}*e_{up}/(3*0,5*4,0*100) + M_{t,d} / W_t$ = 7,86 kN/cm²
v. Mises σ_v = $\sqrt{(\sigma_{x,d}^2 + \sigma_{z,d}^2 - \sigma_{x,d} * \sigma_{z,d} + 3 * \tau_d^2)}$ = 14,05 kN/cm²
coeff. of utilization η = $\sigma_v / f_{alu,d}$ = **1,03 ≅ 1**

Local stress check at extrusion



section 1-1: Contact point at bolt shank

number of bolts n_b =		**4**	
h_{Ex} =		**0,970 cm**	
t_{Ex} =		**0,550 cm**	
b_{Ex} =	**1,08 - t_{Ex}/2**	=	0,805 cm

effective width, with angle of load-spreading = 45°

$b_{eff,Ex}$ =	2* (b_{Ex}+h_{Ex})	=	3,550 cm
moment of restistance W =	1,25 * $b_{eff,Ex}$ * t_{Ex}^2 / 6	=	0,2237 cm³
acting force, per bolt F_d =	1,25 * $q_{hor,d}$ * e_{up}/100 / n_b	=	1,591 kN
stress σ_d =	F_d * h_{Ex} / W	=	6,90 kN/cm²
coeff. of utilization η =	σ_d / $f_{alu,d}$	=	**0,51 ≤ 1**

section 1-1: Contact point between bolt head and vertical web

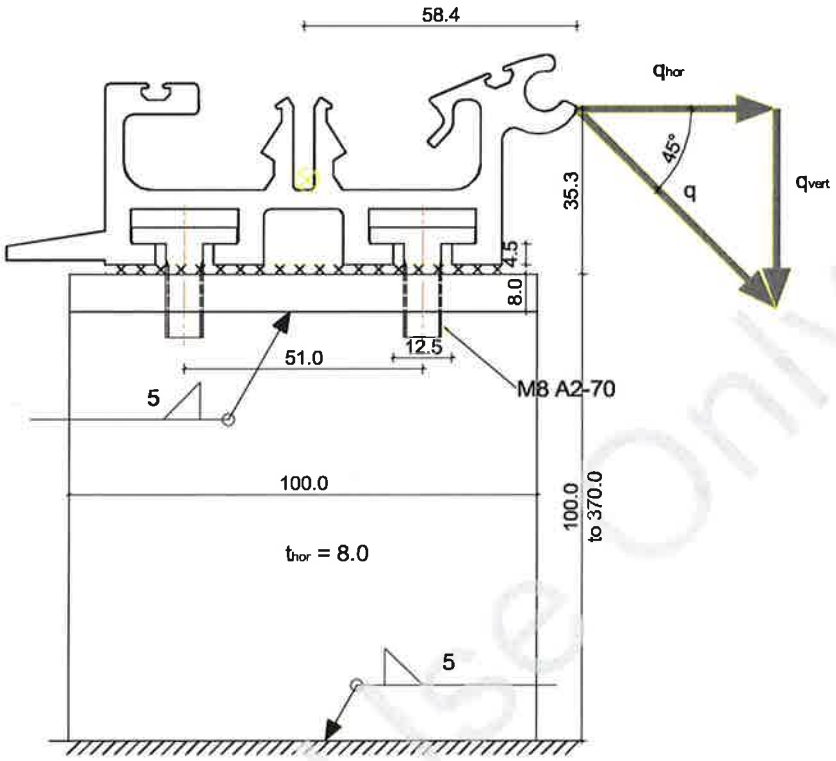
bolt head hight t_b =	**0,400 cm**
bolt head width b_b =	**1,000 cm**

effective width, with angle of load-spreading = 45°

$b_{eff,Ex}$ =	2* h_{Ex} + b_b	=	2,940 cm
moment of restistance W =	1,25 * $b_{eff,Ex}$ * t_{Ex}^2 / 6	=	0,1853 cm³
acting force, per bolt F_d =	1,25 * $q_{hor,d}$ * e_{up}/100 / n_b	=	1,591 kN
stress σ_d =	F_d * h_{Ex} / W	=	8,33 kN/cm²
coeff. of utilization η =	σ_d / $f_{alu,d}$	=	**0,61 ≤ 1**

Pos. 37 Upstands

Material and mechanical System



Hammer-head bolts M8x30 A2-70

number of bolts n_b =	**4**
max. hor. capacity V_{Rd} =	**8,70 kN**
hole diameter d_0 =	**1,25 cm**
bolt diameter d =	**0,80 cm**
eff. thread cross section area A_{Sp} =	**0,370 cm²**
partial safety factor γ_{M2} =	**1,25**
tensile strength bolt f_{ub} =	**70,00 kN/cm²**

steel grade S235 according to EN 10025-2

$f_{y,d}$ = 23,5 / γM0 = **23,5 kN/cm²**

$f_u = \frac{360}{10}$ = 36,0 kN/cm²

Geometry

max. clearance between upstands e_{up} = e_{up} =	**100,00 cm**
clearance between bolts e_b =	**5,10 cm**
load eccentritity e_1 =	**5,84 cm**
load eccentritity e_2 =	**3,53 cm**
max. height of upstands h_{up} =	**10,00 cm**
thickness upstand plate t_{up} =	**0,80 cm**
thickness horizontal plate t_{hor} =	**0,80 cm**
width upstand plate b_{up} =	**10,00 cm**

Loads

Determination of loads from the ultimate strength of the membrane layers

sum layer thickness	t_m =	**0,20+0,20**	= 0,40 mm
allowable stress	f_{all} =	**12,0 N/mm²**	
max. slope of lower layer...	α =	**45,0 °**	
tensile force per meter...	q_d =	$\gamma F * t_m * f_{all}$	= 7,20 kN/m
horizontal force	$q_{hor,d}$ =	$q_d * COS(\alpha)$	= 5,09 kN/m
vertical force	$q_{vert,d}$ =	$q_d * SIN(\alpha)$	= 5,09 kN/m

load component parallel to the extrusion:

horizontal force	$q_{hor,II,d}$ =	$e_{up}/100 * 0,20$	= 0,20 kN/m

Note:

Maximum stresses of 12,0 N/mm² are relevant for long term loads. In general these loads are acting on two layers (i. e. load). The subsequently used load "q" covers the maximum tensile membrane force of 18,0 N/mm² x 0,20 mm = 3,6 N/mm due to wind suction.

Design of upright plate

Area	A =	$b_{up} * t_{up}$	= 8,00 cm²
moment of resistance	$W_{y,el}$ =	$b_{up}^2 * t_{up} / 6$	= 13,33 cm³
moment of resistance	$W_{z,el}$ =	$b_{up} * t_{up}^2 / 6$	= 1,07 cm³

$M_{y,d}$ =	$(q_{hor,d} * (h_{up}+e_2) + q_{vert,d} * e_1) * e_{up} / 100$	=	98,59 kNcm
$M_{z,d}$ =	$(q_{hor,II,d} * (h_{up}+e_2) + q_{vert,d} * t_{up}/2) * e_{up} / 100$	=	4,74 kNcm
σ_d =	$q_{vert,d}/100 * e_{up}/A + M_{y,d}/W_{y,el} + M_{z,d}/W_{z,el}$	=	12,46 kN/cm²
τ_d =	$\sqrt{(q_{hor,d}^2+q_{hor,II,d}^2)} * e_{up} / (100*A)$	=	0,64 kN/cm²
v. Mises σ_v =	$\sqrt{(\sigma_d^2 + 3 * \tau_d^2)}$	=	12,51 kN/cm²

coeff. of utilization η = $\sigma_v / f_{y,d}$ = **0,53 ≤ 1**

plate has to be welded to substructure by fillet-welds
throat dimension **a = 4 mm** (nominal leg D = 5,6 mm)

design: 2 x 4,0 = 8 mm = 1,0 x t_{up}.

s235... βw = 0,80

fvwd = $fu/\sqrt{(3)} / (\beta w * \gamma M2)$ = 20,78 kN/cm²

coeff. of utilization η = σ_v / f_{vwd} = **0,60 ≤ 1**

Bolted connection between extrusion and horizontal plate

horizontal force per bolt $F_{v,d}$ = $\sqrt{(q_{hor,d}^2+q_{hor,II,d}^2)} / (100*n_b) * e_{up}$ = 1,27 kN

vertikal force per bolt $F_{t,d}$ = $(q_{hor,d} * e_2 + q_{vert,d} * e_1) / (e_b * n_b/2)$ = 4,68 kN

resistance according to EN 1993-1-4:2006

single shear

shear joint in thread α = **0,50**

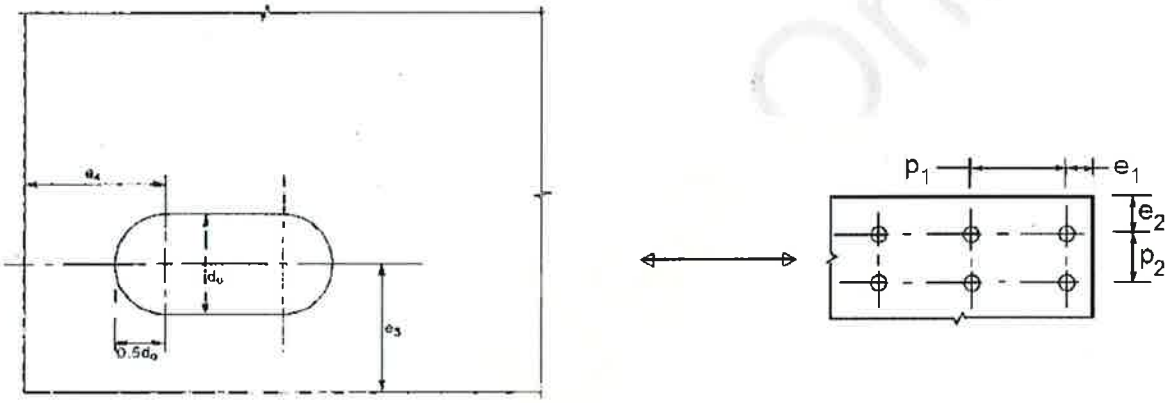
$F_{v,Rd}$ = $MIN(V_{Rd};\alpha * A_{Sp} * f_{ub} / \gamma_{M2})$ = 8,7 kN

tensional force

k_2 = **0,90**

$F_{t,Rd}$ = $k_2 * A_{Sp} * f_{ub} / \gamma_{M2}$ = 18,6 kN

specific pressure on hole



min. edge distance in load direction e_1 = $1,2*d_0$ = 1,50 cm

min. edge distance orthogonal to load direction e_2 = $1,2*d_0$ = 1,50 cm

min. edge distance in load direction (elongated hole) e_3 = $1,5*d_0$ = 1,88 cm

min. edge distance orthogonal to load direction (elongated hole) e_4 = $1,5*d_0$ = 1,88 cm

min. bolt distance in load direction p_1 = $2,2*d_0$ = 2,75 cm

min. bolt distance orthogonal to load direction p_2 = $2,4*d_0$ = 3,00 cm

k_1 = $MIN(2,5 ; 2,8*e_2/d_0-1,7; 1,4*p_2/d_0-1,7)$ = 1,66

horizontal plate:

t_{hor} = **0,80 cm**

α_b = $MIN(e_1 / (3*d_0) ; p_1 / (3*d_0) - 1/4 ; f_{ub} / f_u ; 1,0)$ = 0,400

(for elongated hole = 0,60)

$F_{b,Rd,hor}$ = $0,60 * k_1 * \alpha_b * f_u * d * t_{hor} / \gamma_{M2}$ = 7,34 kN

extrusion profile:

(acc. to DIN EN 1999-1-1 = 0,80 for aluminium)

t_{Ex} = **0,45 cm**

α_b = $MIN(e_1 / (3*d_0) ; p_1 / (3*d_0) - 1/4 ; f_{ub} / f_u ; 0,66)$ = 0,400

$F_{b,Rd,Ex}$ = $0,80 * k_1 * \alpha_b * f_u * d * t_{Ex} / \gamma_{M2}$ = 5,51 kN

check due to shear forces

$F_{v,d}$ = 1,27 kN

$F_{v,Rd}$ = 8,70 kN

η_v = $F_{v,d} / F_{v,Rd}$ = **0,15 ≤ 1**

check due to tensional forces

$F_{t,d}$ = 4,68 kN

$F_{t,Rd}$ = 18,60 kN

$\eta_t = F_{t,d} / F_{t,Rd}$ = **0,25 ≤ 1**

check due to specific pressure on hole

horizontal plate:

$\eta_{b,hor} = F_{v,d} / F_{b,Rd,hor}$ = **0,17 ≤ 1**

extrusion profile:

$\eta_{b,Ex} = F_{v,d} / F_{b,Rd,Ex}$ = **0,23 ≤ 1**

interaction

$\eta_{v+t} = F_{v,d} / F_{v,Rd} + F_{t,d} / (1,4*F_{t,Rd})$ = **0,33 ≤ 1**

Annex - Structural Analysis Printout

Part	Annex	Rev	Subject	Pages
	A	new	ETFE - downward loads	21
	B	new	Structural Steel - lifting loads	21
	C	new	Structural Steel - downward loads	25

D-Bremen, August 14, 2013
Dr.-Ing. Tobias Schween

O² ARCHITECTS

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TRANSMITTAL LETTER

To: **Jackson Contractor Group**
Mike Chase

Date: 4/5/2013

CC: **WB+P**

Project Name: **Parmly Billings Library**

Project Number: **1101**

We transmit:

(x) Herewith
( ) In accordance with your request
( ) Under separate cover via:

For Your

( ) Approval	( ) Information	(X) Distribution to Others
( ) Review & Comment	( ) Record	( ) _____

The following:

(X) Drawings	(X) Shop Drawings	(x) See Below
( ) Specifications	( ) Product Literature	( ) Digital Files

Copies	Date:	Description:	
1		08 6300 -1 (Phase 1) ETFE	**Approved**

Remarks

First of 3 submittals. Need to discuss possibility of offsetting tube to interior to avoid existing wall

Jackson
CONTRACTOR GROUP, INC.
P.O. Box 967, Missoula, MT 59806
406-542-9150 | FAX 542-3515

Submittal Transmittal

Detailed, Grouped by Each Number

Parmly Billings Library
510 N. Broadway
Billings, MT 59101

Project # 2012.35
Tel: 406-542-9150 Fax: 406-542-3515

Jackson Contractor Group Inc.

Date: 4/2/2013 Reference Number: 0174

Transmitted To:
Don Olsen
O2 Architects
208 N. Broadway
Suite 350
Billings, MT 59101
Tel: 406-259-7123
Fax: 406-256-7123

Transmitted By:
Mike Chase
Jackson Contractor Group Inc.
P.O. Box 967
Missoula, MT 59806
Tel: 406.542.9150
Fax: 406.542.3515

Qty	Submittal Package No	Description	Due Date	Package Action
1	0054 - 08 6300 - 2	Metal Framed Skylight - ETFE Skylight	4/8/2013	Submitted

Transmitted For	Delivered Via	Tracking Number
Approval	e-mail	

Items	Qty	Description	Notes	Item Action
0001	1	Mtl Frame Skylight - Calculations		Submitted
0002	0	Mtl Frame Skylight - Drawings		Pending
0003	0	Mtl Frame Skylight - Samples		Pending

Cc:	Company Name	Contact Name	Copies	Notes

Remarks

Don,
Please see the below for sequence of necessary submittal review and approval. Submittals will be transmitted in this sequence to complete the total specification requirements.
April 2nd: Submit load calculations and connection requirements based on the redesign of the structural steel for the skylight system. Our team will be available to address any concerns and explain the modifications.
April 8th: Submit steel shop drawings and provide necessary assistance for approval.
April 16th: Submit Texlon System drawings

Thanks,
Mike

MIKE CHASE
Signature

4.2.13
Signed Date

Jackson
CONTRACTOR GROUP, INC.
P.O. Box 967, Missoula, MT 59806
406-542-9150 | FAX 542-3515

Submittal Packages

Summary with Register Items & Stamp

Parmly Billings Library
510 N. Broadway
Billings, MT 59101

Project # 2012.35

Jackson Contractor Group Inc.
Tel: 406-542-9150 Fax: 406-542-3515

Item No	Register No	Rev	Spec Section	Sub Section	Description	Responsible	Supplier	Rec'd On	Action
0054 - 08 6300 - 2			**Metal Framed Skylight - ETFE Skylight**						
0001	00194	2	08 63 00	1.03.A	Mtl Frame Skylight - Calculations	Vectorfoiltec, LLC	Texlon	4/2/2013	Submitted
0002	00195	2	08 63 00	1.03.B	Mtl Frame Skylight - Drawings	Vectorfoiltec, LLC	Texlon	4/2/2013	Pending
0003	00196	2	08 63 00	1.03.C	Mtl Frame Skylight - Samples	Vectorfoiltec, LLC	Texlon	4/2/2013	Pending

SUBMITTAL REVIEW

__REVIEWED, NO EXCEPTIONS TAKEN __REVISE AND RESUBMIT
__NOTE COMMENTS __SEE ATTACHED COMMENTS

Corrections or comments made to the shop drawings during this review do not relieve subcontractor/vendor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The subcontractor/vendor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of all other trades, and performing his work in a safe and satisfactory manner.

JACKSON CONTRACTOR GROUP, INC.

BY MIKE CHASE DATE 4.2.13

SHOP DRAWING / SUBMITTAL REVIEW

☒ ☐

will bruder architects kent mcclure 04.05.13

rudow + berry
structural engineers

This review was performed only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the plans and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component.

Contractor is Responsible for:
* Dimensions to be confirmed and correlated at the jobsite.
* Information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction.
* Coordination of the work of all trades.
* Performing all work in a safe and satisfactory manner.

■ Approved ☐ Revise and Resubmit
☐ Approved As Corrected ☐ Rejected
■ Reviewed For Loading Only ☐ Resubmit Record Copy

Reviewed By: MAR Date: 04/05/2013

Architect Please Note: Please verify that revised ring beam size (TS14x6) is acceptable. yes

Vector Foiltec • 13 Green Mountain Drive • Cohoes • New York 12047 USA

13 Green Mountain Drive
Cohoes, New York
12047 USA
T +1 518 783 0575
F +1 518 783 0474
us@vector-foiltec.com
www.vector-foiltec.com

March 26, 2013

Jackson Contractor Group, INC.
ATTN: Mike Chase

RE: Parmly Billings Library - Notice of Submittal Delay

A/E - FYI see proposed structural steel solution enclosed

Mike,

Vector Foiltec's original schedule required the shop drawings to be approved by 11/30/2012 to meet the completion date of 4/4/2013 (17 weeks after approval). As discussed previously, we will not be able to meet the hand-over date by the beginning of April. At this time all shop drawings and samples have been submitted, with the exception of the steel and Texlon shop drawings, which are dependant on the approved structural calculations.

The extended duration for resubmitting the necessary information was the result of the following activities:

The original design called for a 5" tubular ring beam to be welded to 16 upright posts. The architect's intent was for the skylight structure to transmit vertical loads to the posts without imposing additional horizontal loads. Based on the connection type, and the tubing size specified, the skylight structure was found to transmit unintended loads to the posts. Our engineer from TSS in Germany, Dr. Schween, first noted that the posts could not take the calculated loads and advised that their wall thickness be increased. Due to the connection detail described in the structural drawings, he also determined that there was still a limit to the post's capacity. Based on these limitations, he calculated for the climactic loads using the ASCE tables, in order to prevent the posts from being overstressed. It was also suggested that the structural steel may require re-design.

Vector Foiltec has concluded that re-design is necessary for the skylight structural steel in order to balance the loads among the support posts. The 16 support posts for the skylight are already supplied and installed. Grid Engineering, Seattle Washington, is currently specifying the required ring beam material and a connection detail between it and the posts. They will be providing the stamped calculations and drawings for review. These calculations with the modified structure are necessary to complete the steel and Texlon shop drawings. We have made every effort to resolve this issue without affecting the design, however the originally specified components and the provided posts limit this capability. This can only be accomplished by increasing the size of the steel ring beam and modifying the connection between it and the posts.

GRID
engineers

April 01, 2013

Mr. Philipp Lehnert
Project Manager
Vector Foiltec
13 Green Mountain Drive
Cohoes, NY 12047

Re: Parmly Library
Main ETFE Roof Skylight

Dear Philipp,

Thank you for the opportunity to work with you on the Parmly Library project.

Attached please find the calculation package for the steel design and loads imposed on the existing roof structure. This package is in coordination with the ETFE designers in Bremen. Geometry and various design details for the existing structure were found within the set you forwarded us (01May 2012, 100CD set, 14 structural sheets s1.0-s7.0). If you determine any condition in the field varies from that what is stated here, please contact us before proceeding.

Please have the EOR contact us directly if there are any questions with the information during their review. We appreciate the opportunity to work with you on this project. If you have any questions, please feel free to call us at 206.838.4000.

Sincerely,

Bryan Tokarczyk
Partner

blt:psd:file

Enclosures
120059.10

grid
box 30797
seattle 98113

Vector Foiltec
Parmly Library
[Main ETFE Skylight Assembly]

Billings, MT

Structural Calculations

Calculations Included:
These calculations cover the proposed skylight assembly loads imposed to the main facility roof

Project Number 120059.00
April 01, 2013

grid
box 30797
seattle 98113

Enclosure One

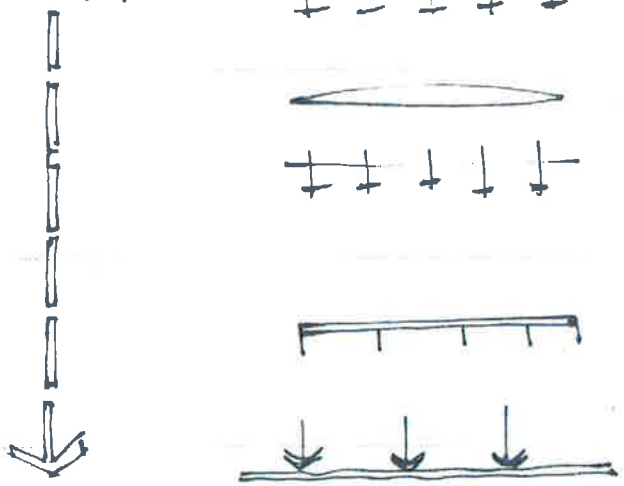
grid
box 30797
seattle 98113

GRID
structural engineers
seattle, wa
206 838 4000

project	FAMILY LIBRARY - ETFE SKYLIGHT	job #	120059
		engr	date
		engr 2	page

MAIN SKYLIGHT / ROOF

- SCHEMATIC



ENVIRO LOADING [DESCRIBED HERE]

ETFE DESIGN [ATTACHED AS REFERENCE]

ETFE LOAD XFER [DESCRIBED HERE]

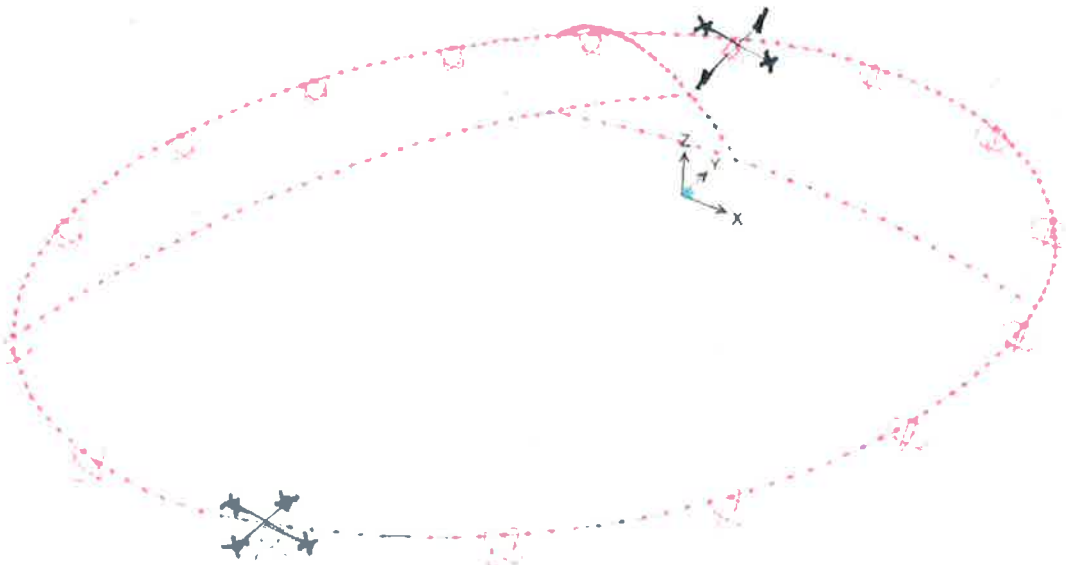
STEEL DESIGN [DESCRIBED HERE]

LOADS IMPOSED TO ROOF SUPPORTS [DESCRIBED HERE]

- SKYLIGHT SYSTEM CONSISTS OF STEEL FRAME WITH ETFE MEMBRANE CUSHIONS AS ENVIRONMENTAL SURFACE
- APPROX DIMENSIONS 24' x 32' (≈ 600□' AREA)(≈ 630□' SURFACED)
- ETFE ≈ 100 #/□' @ ≈ 10 Mil THICKNESS (.01")
- STEEL ≈ 490 #/□' @ 50ksi (E)
- TAKE-OFF

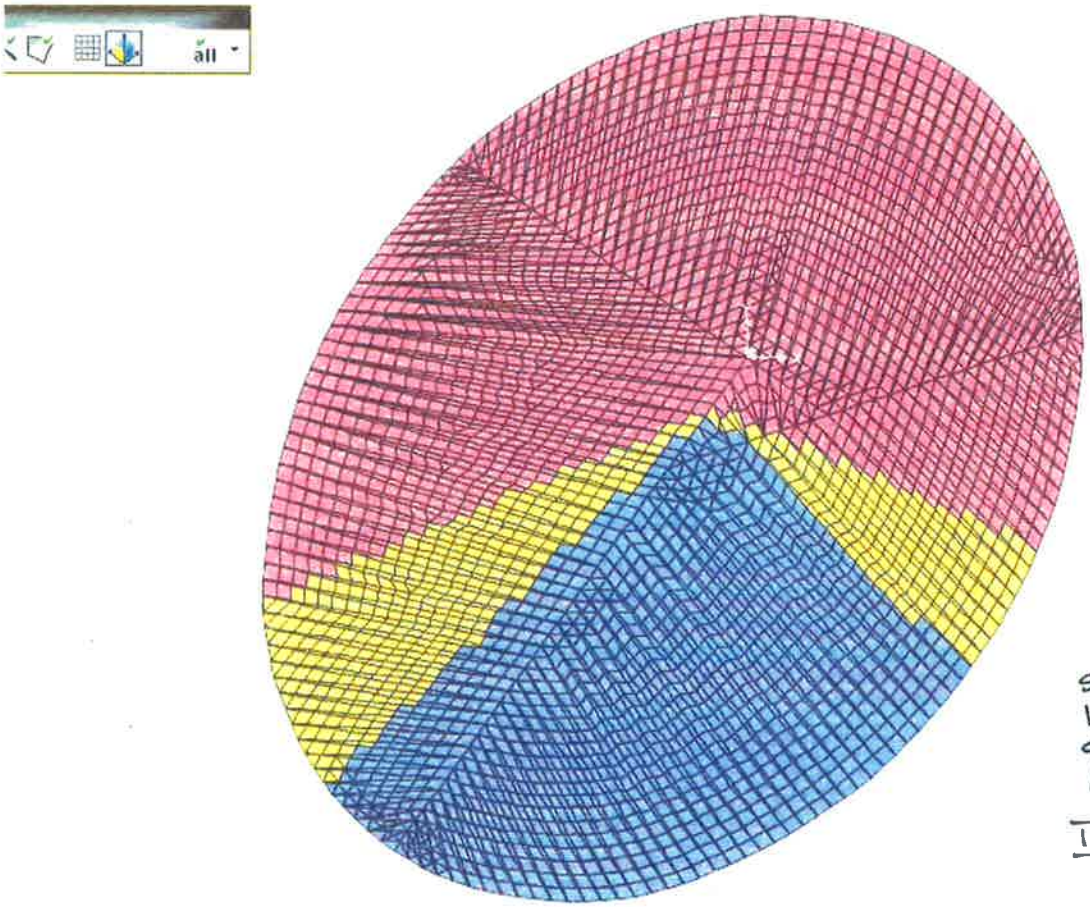
			Pb	Ppb	Pppb
STEEL PERI	2(25.5' + 18.75')	87.5'	1660 #	2500	4640
STEEL CROSS	(14.75' + 15.25' + 20')	50.0'	950 #	1425	2650
		137.5'	2600 #	3900	7300

ETFE FOIL (630□' * .08 #/□') = 50#



BASIC STEEL FRAME
(W/ORIENTATION)

IMAGE A



SHELLED FRAME
W/ EXAMPLE DRIFT
SNOW LOADING
APPLIED

IMAGE B

GRID
structural engineers
seattle, wa
206.838.4000

project | job #
end 1 | date
end 2 | page

MAIN SKYLIGHT / ROOF

- LOAD COMBOS (IBC 09 / AT-5)

C1 = 1.4D + 1.4 P_n
C3 = 1.2D + 1.2 P_n + 1.6S + .8W
C4 = 1.2D + 1.2 P_n + .5S + 1.6W
C6 = .9D + 1.4 P_n + 1.6W

D = SELF STEEL + ETFE SYSTEM
P_n = PNUEMATIC LOADING FROM ETFE SYSTEM UNDER LOAD
S = SNOW - BAL + UNBALANCE CASES
W = WIND - DOMED SURFACE

*PONDING + ICE LOADS CONSIDERED AND NOT CONTROL (FOLLOW DESIGN - ETFE STRESSING CONSIDER / REPEATS)

- LOAD COMBOS (n = NORTH ATTACK WIND)

C1 1.4D + 1.4 P_n

C3 1.2D + 1.2 P_n + 1.6S + .8W

C3SWn	C3DWn
C3SWs	C3DWs
C3SWe	C3DWe
C3SWw	C3DWw
[UNIFORM]	[DRIFTING]

C4 1.2D + 1.2 P_n + .5S + 1.6W

C4SWn	C4DWn
C4SWs	C4DWs
C4SWe	C4DWe
C4SWw	C4DWw
[UNIFORM]	[DRIFTING]

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structural engineers
seattle, wa
206.838.4000

project | job #
eng 1 | date
eng 2 | page

▷ MAIN SKYLIGHT / ROOF

- LOAD COMBOS (cont.)

  cb $.9D + 1.4P_n + 1.6W$

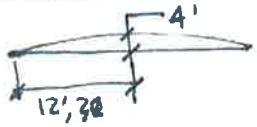
  $cb\,W_n$
  $cb\,W_s$
  $cb\,W_e$
  $cb\,W_w$

- WIND
  - V = 90 MPH (3 SEC) (FIG 6-1)
  - EXP. C / I_w = 1.15 (CAT III)
  - BUILDING ENVELOPE
  - IMPACT RESISTANT GLAZING
  - RIGID STRUCTURE
  - SIMPLIFIED (METH 1)
    - $P_{net} = \lambda I P_{net30}$ (H ≤ 40') ZONE 1 / ROOF ≤ 0° / ∈ $C_p = \pm .9$

      $= 1.49(1.15)\{4.7, -13.3\}$

      $= \{8.1, -22.8\}$ ~~10~~ MIN PRESSURE OVERRIDE

      ⚠ USE $P_{net} = \{+10, -22.8\}$ PSF

- SNOW
  - P_g = 20 PSF (FIG 7-1)
  - 

    4'/12' ≈ 18° FLAT (A7) ≤ 5°
    4'/16' ≈ 14° ⚠ NOT FLAT, SLOPED...
  - YET, CONSERVATIVE ESTIMATION IS FLAT DUE TO FLEXIBLE PILLOWS - SNOW WILL ACCUMULATE, WARM ROOF EFFECT NOT APPLY (CONSERV.)

  ⚠ FLAT - $P_f = .7 C_e C_t I P_g$

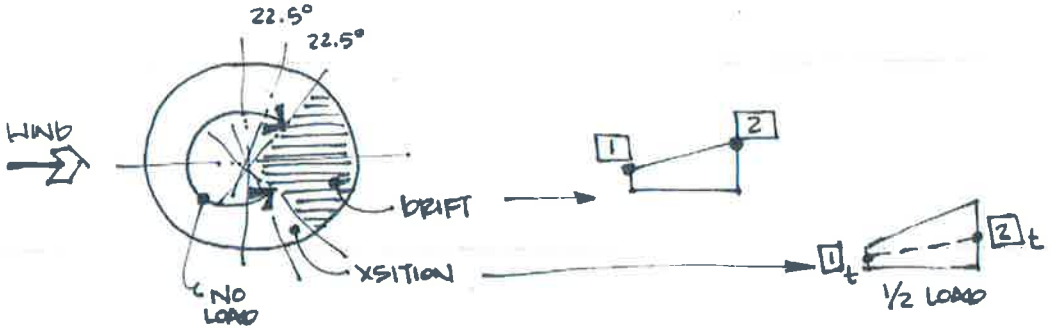
  $= .7(1.0)(1.0)(1.1)(20\,PSF) = 15.4$ PSF

  NOTE: MT RULE OVERRIDE - TAKE P_f = 30 PSF ("ROOF LOADING" ≥ 30 PSF)

MAIN SKYLIGHT / ROOF

- SNOW (cont.)

- UNBALANCED CONSIDERATION (7.6.4)(7.6.2)



C_s = .8 – 1.0 (FIG 7-2a)

C_e = 1.0 (TABLE 7-2)

DESIGN UNBALANCED

[1] $.5P_f = \frac{15.4}{2} = 7.7$ PSF ~~7.7 PSF~~ 30 PSF

[2] $2.0P_f \frac{C_s^*}{C_e}$

$2.0(15.4)\frac{.8}{1.0} = 24.6$ PSF ~~24.6 PSF~~ 30 PSF

XSITION UNBALANCED

[1]t $= \frac{7.7}{2} = 3.85$ PSF ~~3.85 PSF~~ 15 PSF

[2]t $= \frac{24.69}{2} = 12.3$ PSF ~~12.3 PSF~~ 15 PSF

(OVERRIDE FOR MT RULE 30 PSF MIN ROOF LOADING)

- NOTE: LOADS IMPOSED AT TOP OF EXISTING TUBE POSTS (SEE DWGS)

GRID
structural engineers
seattle, wa
206.838.4000

project	job #	
	engr	date
	engr	page

MAIN SKYLIGHT / ROOF

- FIXITY SCHEME – TARGET ± Z FIXITY ON ALL 16 SUPPORTS
  - RESTRAINT FOR STABILITY IN X + Y PER DIAGRAM
  - LOADS IMPOSED WILL REFLECT (NOTE: CHOICE OF RESTRAINED X,Y POSTS IS ARBITRARY AND CAN BE MOVED IF NEEDED, PLEASE CONTACT)
  - SEE IMAGE A
- ETFE PNUEMATIC XFER – SEE IMAGE C, D, E, F
- STEEL FRAME SIZING – SEE IMAGE G, H
- LOADS IMPOSED ON IMAGE J
- GLOBAL LOADS IMPOSED ON IMAGE K

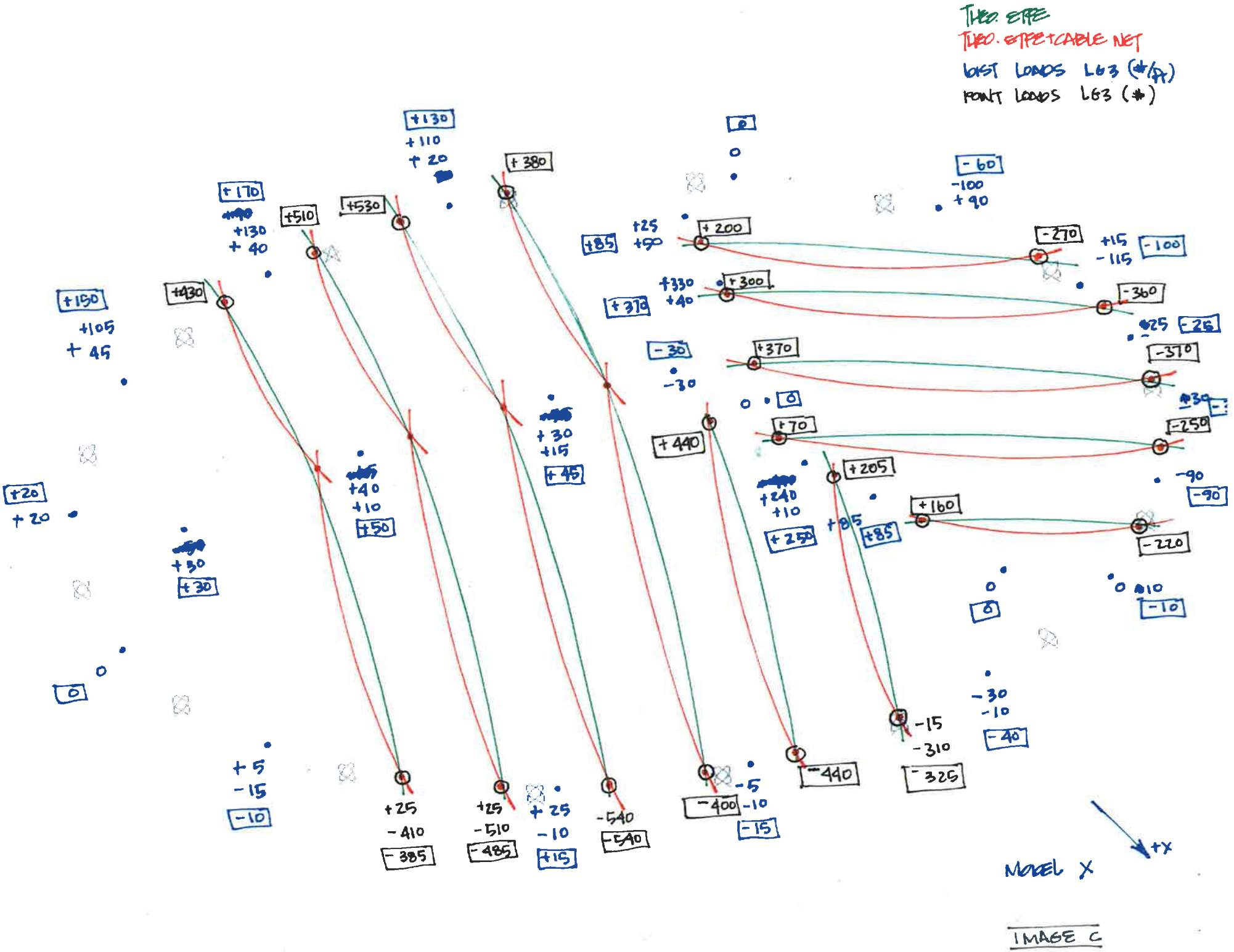
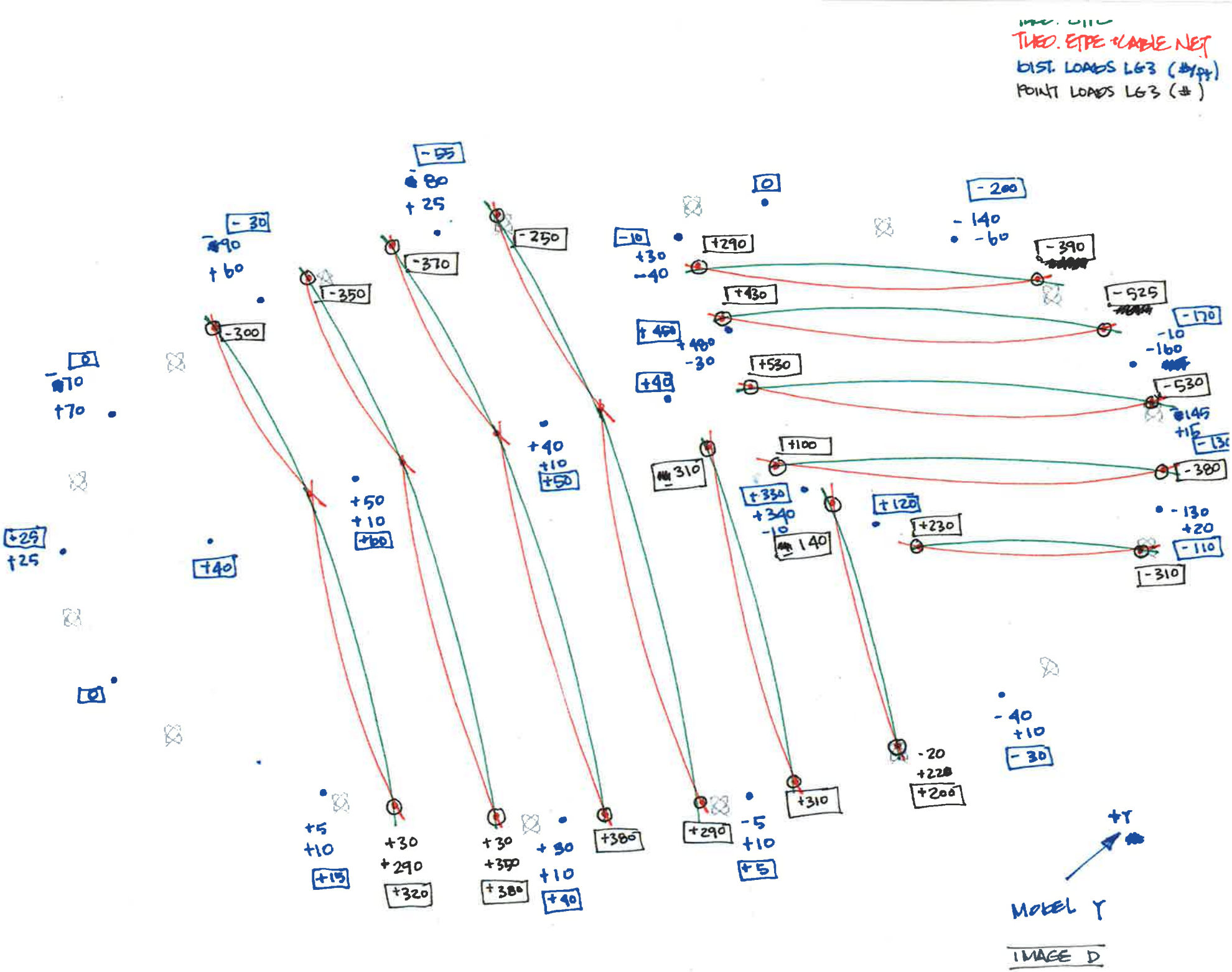

THEO. EIFFE
THEO. EIFFE+CABLE NET
DIST LOADS LB3 (#/ft)
POINT LOADS LB3 (#)
+130
+110
+20
+380
+170
+130
+40
+510
+530
+430
+150
+105
+45
+20
+20
+30
+30
+40
+10
+50
+5
-15
-10
+25
-410
-385
+25
-510
-485
+25
-10
+15
+30
+15
+45
-540
-540
+85
+25
+90
+200
+330
+40
+300
+370
-30
-30
0
0
+440
+240
+10
+250
+70
+205
+85
+85
+160
-400
-5
-10
-15
-440
-15
-310
-325
-30
-10
-40
0
0
-60
-100
+90
-270
+15
-115
-100
-360
+25
-25
-370
+30
-250
-90
-90
+10
-10
+X
MODEL X

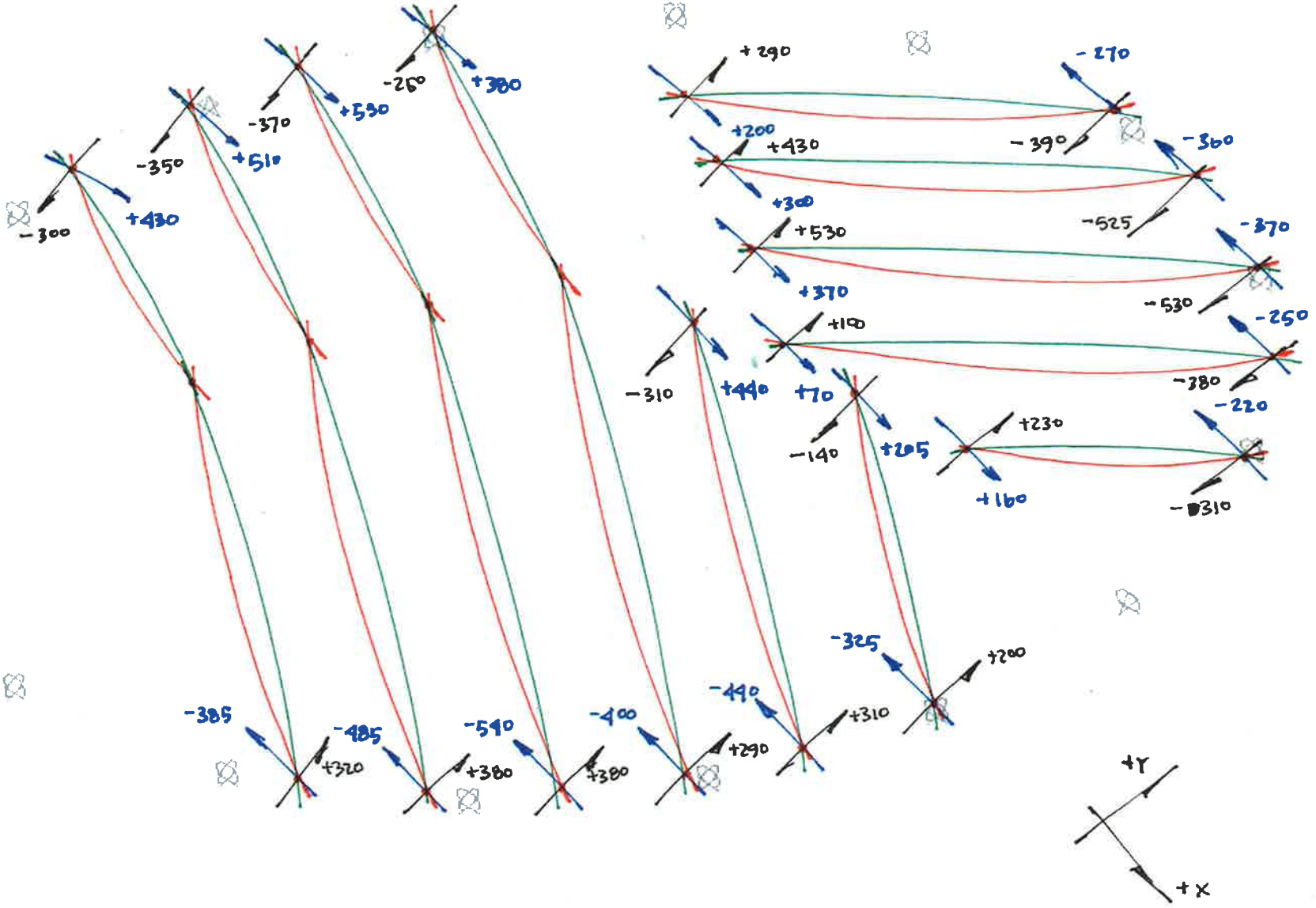
IMAGE C


THEO. ETPE CABLE NET
DIST. LOADS LG3 (#/ft)
POINT LOADS LG3 (#)
-55
-80
+25
-30
-90
+60
-350
-370
-250
-300
0
-70
+70
+25
+25
+40
+50
+10
+100
+40
+10
+50
+5
+10
+15
+30
+290
+320
+30
+350
+380
+30
+10
+40
+380
-10
+30
-40
+290
+430
+460
+480
-30
+490
+530
+100
310
+330
+340
-10
140
+120
+230
+290
-5
+10
+5
+310
-20
+220
+200
-200
-140
-60
-390
-525
-170
-10
-160
-530
#145
+15
-130
+20
-110
-310
-40
+10
-30
+Y
MODEL Y
IMAGE D

THEO. ETFE CABLE NET

POINT LOADS (x) #

POINT LOADS (Y) #



+Y

+X

IMAGE E

INIT. ETFE
THEO. ETFE+CABLE NET
DIST LOADS (X) #/FT.
DIST LOADS (Y) #/FT.

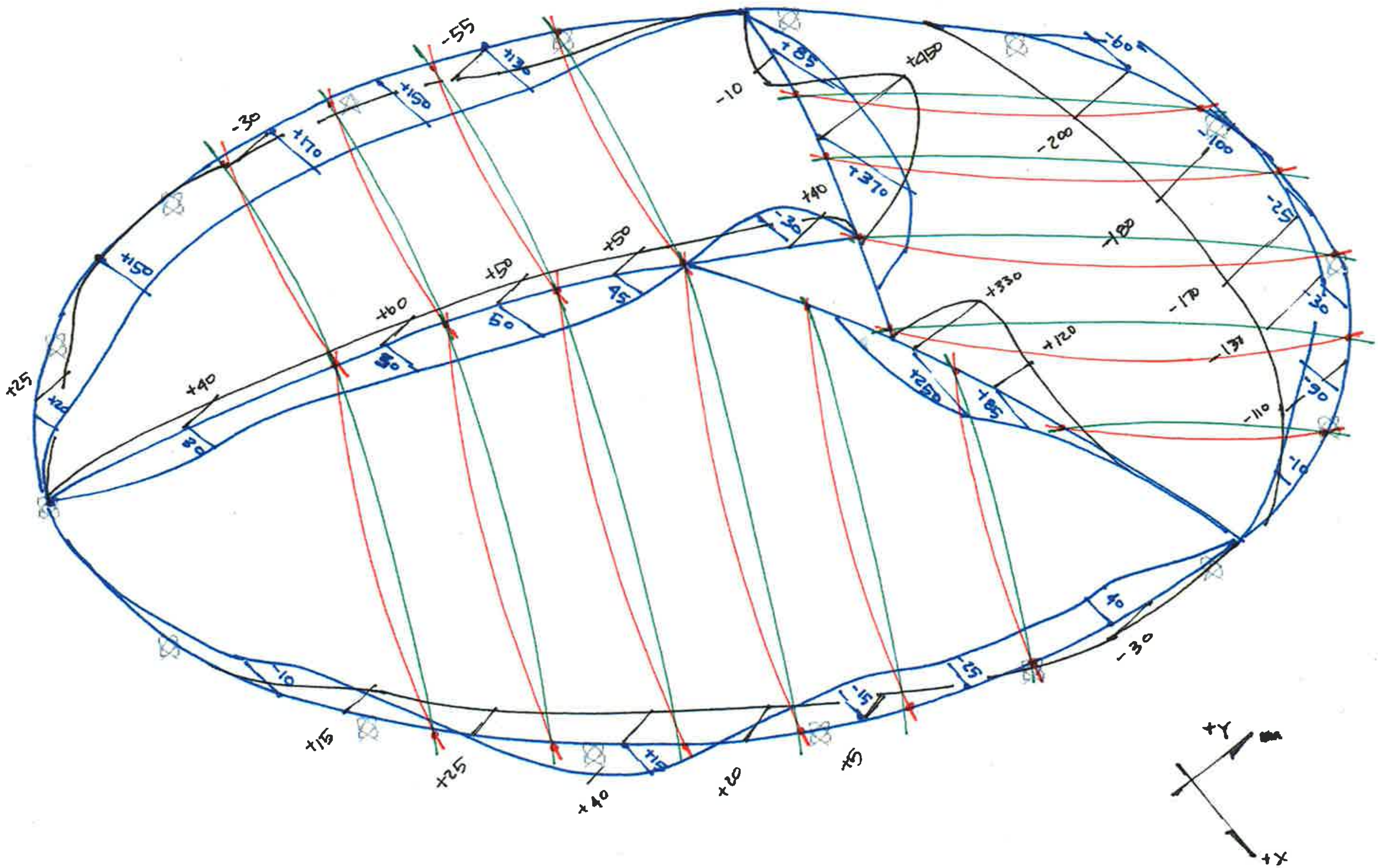


IMAGE F

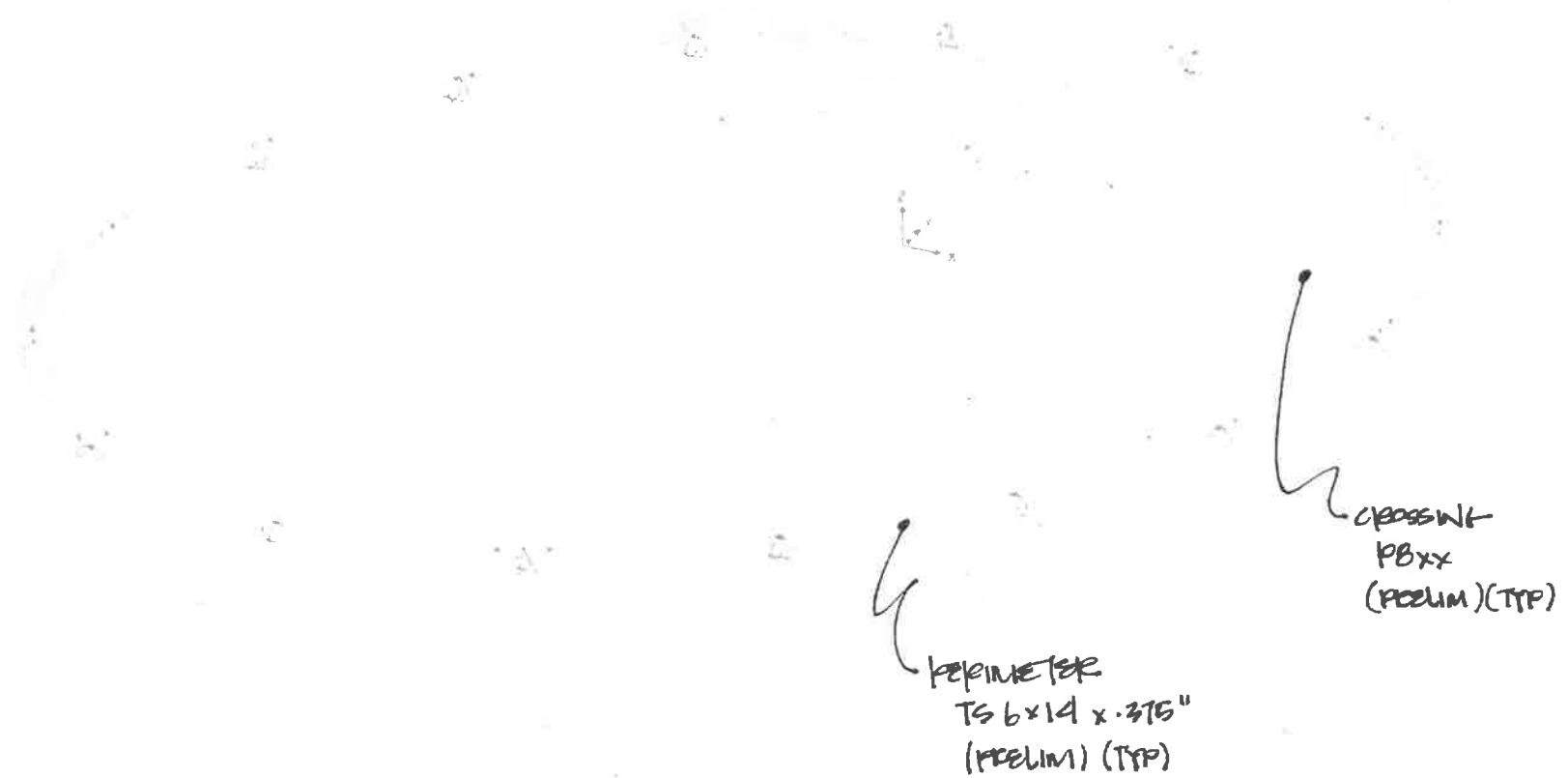
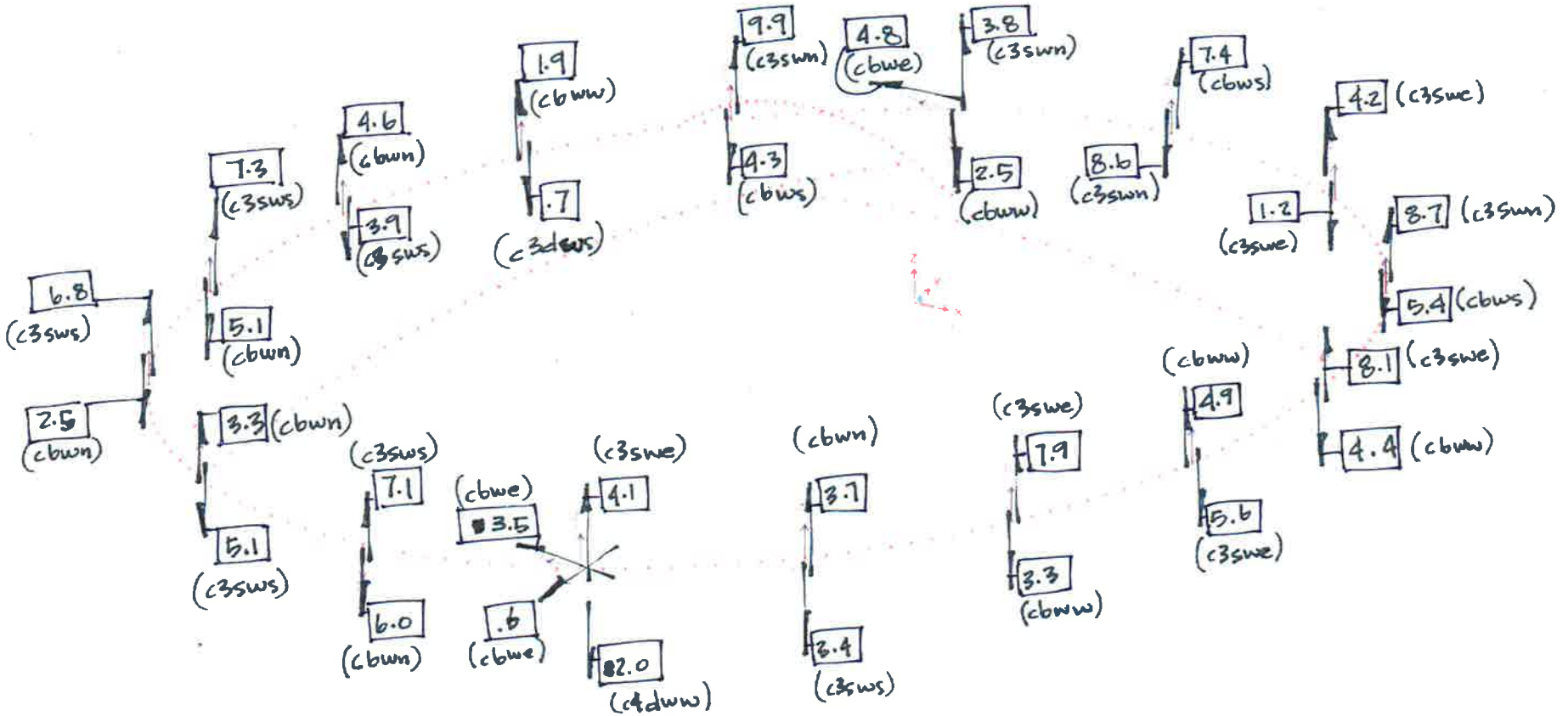


IMAGE 6

IMAGE H

STEEL + GLASS SYSTEM



- ULTIMATE LOADS (IN KIPS)
- REACTIONS (▲ UPWARD IS RESPONSE TO FORCE ACTING IN GRAVITY DIRECTION

STEEL FRAME W/ CONTROLLING REACTION (+L.CASE) (KIPS)

IMAGE J

Parmly ETFE foil skylight system - version D
GRID / akd / ffj
Mar-13

TABLE: Base Reactions

OutputCase	GlobalFX	GlobalFY	GlobalFZ	GlobalMX	GlobalMY	GlobalMZ	XCentroidFZ	YCentroidFZ	ZCentroidFZ
Text	Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	ft	ft	ft
c1	-7.331	-0.548	10.567	-16.466	0.341	-11.323	-0.032	-1.558	0.000
c3swn	-5.246	-0.575	35.093	-51.751	50.066	-9.070	-1.427	-1.475	0.000
c3sws	-5.096	-0.447	37.153	-163.371	80.917	-6.981	-2.178	-4.397	0.000
c3swe	-5.589	-0.500	36.138	-93.785	17.202	-8.452	-0.476	-2.595	0.000
c3sww	-4.793	-0.538	35.865	-120.784	113.579	-7.647	-3.167	-3.368	0.000
c3dwn	-6.131	-0.407	16.654	-73.881	17.503	-10.031	-1.051	-4.436	0.000
c3dws	-5.804	-0.464	17.112	-12.418	14.035	-8.954	-0.820	-0.726	0.000
c3dwe	-5.787	-0.522	14.914	-35.792	36.301	-8.340	-2.434	-2.400	0.000
c3dww	-6.153	-0.355	14.188	-33.952	-6.074	-9.435	0.428	-2.393	0.000
c4swn	-6.293	-0.590	10.133	86.831	-23.514	-11.609	2.321	8.570	0.000
c4sws	-5.992	-0.335	14.253	-136.408	38.188	-7.432	-2.679	-9.571	0.000
c4swe	-6.980	-0.442	12.223	2.763	-89.241	-10.374	7.301	0.226	0.000
c4sww	-5.386	-0.518	11.678	-51.234	103.513	-8.764	-8.864	-4.387	0.000
c4dwn	-6.569	-0.538	4.370	79.915	-33.690	-11.909	7.709	18.286	0.000
c4dws	-6.213	-0.340	7.990	-89.236	17.288	-8.049	-2.164	-11.169	0.000
c4dwe	-7.041	-0.448	5.590	20.886	-83.273	-10.339	14.897	3.736	0.000
c4dww	-5.811	-0.461	4.903	-24.099	66.121	-9.323	-13.485	-4.915	0.000
c6wn	-7.727	-0.652	-1.575	129.572	-55.124	-13.816	-34.990	-82.246	0.000
c6ws	-7.426	-0.396	2.545	-93.667	6.579	-9.639	-2.585	-36.811	0.000
c6we	-8.414	-0.504	0.515	45.504	-120.851	-12.581	234.862	88.433	0.000
c6ww	-6.820	-0.580	-0.030	-8.492	71.903	-10.972	2364.679	279.290	0.000

IMAGE K

Enclosure Two

grid
box 30797
seattle 98113

TEST REPORT

PTC Alliance

Alliance Tubular Products LLC
A PTC Alliance Company
P.O. Box 2298
Alliance, OH 44601-0298

BUY AMERICAN

PURCHASE ORDER NUMBER	PTC Order Number	PAGE	FORM:
33345	821444	1	48-001

SHIP TO
TEAM TUBE LLC
C/O BUCKEYE HONE
1882 BUTLER PIKE
MERCER, PA 16137

SOLD TO
TEAM TUBE LLC
13821 NE JARRETT ST
PORTLAND, OR 97230

The following tests were successfully performed:
NON-DESTRUCTIVE ELECTRICALLY TESTED

The following shipments are included in this report:

SHIP DATE:	04/03/13			Killed Steel
B/L NUMBER:	04105113	ship# 0001		

— fold — Inches (mm) — fold —

ERW STEEL MECHANICAL TUBES- CD SIZE: 5.500 (139.70) OD x 4.488 (114.00) ID
SPEC: ASTM A513-12, ST52.3, ERW, TYPE 5, SRA, AW, MECHANICAL TUBING
GRADE: ST52C / 317MM HT: STRESS RELIEVE

HEAT NUMBER	PCS.	TOTAL LENGTH SHIPPED	YS- ksi (N/mm2)	TS- ksi (N/mm2)	% ELONG. IN 8"	HARDNESS	Y/T
46677D	18	416' 7"	83.5 (576)	102.9 (709)	24%	96 RB	

HEAT NO.	TYPE	C	MN	P	S	SI	CR	NI	MO	CU	AL	CA	V	SN
46677D	LADLE	0.14	1.44	.011	.002	0.24	0.04	0.01	<.01	0.03	.043	.002	<.001	<.01

THIS IS TO CERTIFY THAT THE ABOVE PRODUCTS HAVE BEEN MADE IN THE U.S.A. AND HAVE BEEN INSPECTED AND TESTED IN ACCORDANCE WITH AND HAVE MET ALL REQUIREMENTS OF THE SPECIFICATION.
PTC ALLIANCE by David E. Misutka

"THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHED AS A FELONY UNDER FEDERAL STATUTES, INCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47."