NOTICE TO CONTRACTORS

EXHIBIT A

Art Building Reroof Project

Bid Number: ................................................................. 09-984
Bid Opening Date: ....................................................... April 27, 2010
Bid Opening Time: ............................................................. 2 p.m.

Request bids from:
California State University, Stanislaus
Facilities Services Department
One University Circle, Turlock, CA 95382

Submit bids on the appropriate bid proposal form in a sealed envelope plainly marked "BID OPENING" and with the following information:

<table>
<thead>
<tr>
<th>April 27, 2010</th>
<th>Art Building Reroof Project</th>
<th>09-984</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Date of Bid Opening)</td>
<td>(Project)</td>
<td>(Bid Number)</td>
</tr>
</tbody>
</table>

Mail or Submit Bids to:
Debbie Da Rosa, Buyer III Lead
California State University, Stanislaus
One University Circle
Turlock, CA 95382
Ph: (209) 667-3987

Direct All Technical Questions to:
Campus Project Manager: Tim Overgaauw
Ph: (209) 667-3211

INSTRUCTIONS TO BIDDERS
California State University, Stanislaus will receive sealed bid proposals at the reception desk in the Mary Stuart Rodgers Building Room 290, Turlock, CA 95382, until 2:00 p.m., April 27, 2010, for furnishing all labor, materials and equipment for the Art Building Re-Roof Project 09-984, for California State University, Stanislaus. The bids will be publicly opened and read in the Mary Stuart Rogers Building conference room 285.

In general, the work consists of removing existing roof comprised of multiple layers of fiberglass ply sheets w/ a granulated surface over wood fiberglass insulation over the building roof deck and install new 60 mil fully adhered PVC membrane over siliconized gypsum barrier board on the Art Building located on the CSU Stanislaus Turlock Campus. All work is to be in accordance with the plans and specifications prepared by CRC Consulting. All technical questions during bidding should be addressed only to the Project Manager, Tim Overgaauw. The construction estimate is $318,000.00. Plans and specifications may be seen at any area Builders Exchange and http://www.csustan.edu/FinancialServices/Purchasing/Bid-BidResults.

Plans and specifications may be obtained at the mandatory Pre-bid conference or by phone from Debbie DaRosa, telephone (209) 667-3987, after the required refundable deposit of $100.00 has been made. A non-refundable fee of $20.00 is also required if USPS ground mailing is requested by the bidder (the fee will be more if overnight mailing is requested). Checks shall be made payable to CSU Stanislaus. General Contractors are allowed two (2) sets each; subcontractors, one (1) set each on plan deposit. Deposits will be returned by the University if the plans and specifications are returned within 30 days after bid award in good condition and unmarked. Marked-up drawings, missing sheets and unbound specifications are sufficient reasons for forfeiture of deposits. Additional sets of plans and specifications may be purchased at the University for $100.00 each. No refund will be made for any additional sets purchased.

**A mandatory pre-bid conference has been scheduled for Tuesday, April 13, 2010, at 10:00 a.m. in the South Dining Hall**, located in building #12 on the campus map.

Each bidder offering a proposal must comply with the bidding provisions of Article 2.00 et seq. of the Contract General Conditions, Exhibit C, and Article 4.02(c) regarding the prevailing wage rates. The general prevailing wage rates apply and can be obtained from the Department of Industrial Relations on the Internet at www.dir.ca.gov. If a bidder intends to use a craft or classification which is not listed in the prevailing wage rates obtained from the Department of Industrial Relations, the bidder may be required to pay the wage rate of the craft or classification most closely related to it. These rates are the minimum that may be paid by the Contractor. Nothing contained in the contract documents shall be construed as preventing the Contractor from paying more than the minimum rate. Extra compensation for inability of the Contractor to hire labor at minimum rates or for payments by the Contractor of subsistence, travel time, overtime, or added compensation will not be allowed to the Contractor by the University.
The Bidder's attention is called to the Disabled Veteran Business Enterprise (DVBE) participation requirements. The successful bidder must achieve a minimum goal of 3% DVBE participation in contracting construction projects as established in the bidding documents.

Failure to comply with the DVBE requirement may cause your bid to be deemed non-responsive and you will be ineligible for award of this contract. Bidders shall contact the University's DVBE Program Advocate, Phyllis Crittendon, (209) 667-3243.

It will be the responsibility of each bidder to obtain a Bid Proposal Package in sufficient time to fulfill requirements therein. Bid Proposal Packages are obtainable only by contractors licensed in the State of California, with a C39 license.

By__________________________ Date________________________
Debbie Da Rosa
Buyer III Lead

SUPPLEMENTAL ATTACHMENT
DVBE REQUIREMENTS

DOCUMENTATION REQUIREMENTS

The first and second apparent low bidders (base bid) shall express mail or hand deliver documentation of their efforts to achieve participation by DVBE subcontractors and suppliers including second and third tier participation, to the address listed below, within two (2) working days following bid opening. Include full subcontractor information as required by Article 2.04b. Failure to submit full and accurate documentation within the time allowed may result in award of the bid to the next lowest response and responsible bidder. Please fill out and attach the DVBE transmittal form as a cover sheet to the documents.

The University may, at its discretion, request additional bidders to submit the requisite documentation at any time after bid opening and before award of the contract. Such
documentation must be provided within two (2) working days of receipt of the University’s request.

California State University, Stanislaus
Attention: Phyllis Crittendon, Senior Buyer
One University Circle
Turlock CA 95382
Telephone: (209) 667-3243
Re-Roof Specification & Details

prepared for

CSU STANISLAUS ART BUILDING
1 University Circle
Turlock, CA

February, 2010

submitted to:

Mr. Tim Overgaauw
Facilities Maintenance Manager
CSU Stanislaus
1 University Circle

All ideas, designs, arrangements and plans indicated or represented by the specifications or drawings are owned by, and the property of, CRC Consulting Group, Inc., and were created, evolved and developed for use on, and in conjunction with, the specified project. None of such ideas, text, designs, arrangements or plans shall be used by, or disclosed to, any person, firm or corporation for any purpose whatsoever without the written permission of CRC Consulting Group, Inc. Filing of these specifications and/or drawings with any public agency is not publication of same and no copying, reproduction or use thereof is permissible without the consent of CRC Consulting Group, Inc.
# TABLE OF CONTENTS

## DIVISION 1 - GENERAL REQUIREMENTS
- Section 01010 - Work Summary ............................................... 01010 pages 1 - 3
- Section 01100 - Substitutions ................................................ 01100 page 1
- Section 01200 - Coordination and Meetings ......................... 01200 pages 1 - 2
- Section 01300 - Submittals ..................................................... 01300 page 1
- Section 01400 - Quality Control ........................................... 01400 page 1
- Section 01500 - Protection and Use of Facilities ............... 01500 pages 1 - 3
- Section 01570 - Regulations and Safety ............................. 01570 pages 1 - 2
- Section 01600 - Equipment and Materials ......................... 01600 pages 1 – 2

## DIVISION 2 - SITE CONSTRUCTION
- Section 02075 – Removal of Asbestos .................................... 02075 pages 1 – 3
  - Asbestos Report ........................................................................ page 1

## DIVISION 6 - WOOD COMPONENTS
- Section 06100 – Roof Related Wood Components ............. 06100 pages 1 – 6

## DIVISION 7 - MOISTURE PROTECTION
- Section 07221 – Roof Insulation ............................................. 07221 pages 1 – 12
- Section 07531 – PVC Single Ply Roofing ............................... 07531 pages 1 – 14
- Section 07620 – Roof Related Metal Work ......................... 07620 pages 1 – 6

### Drawings
- Detail Plotted Pages ................................................................. pages 1 - 2
- Roof Plan .................................................................................. RP1
1.01 WORK SUMMARY

The work included in this specification includes work to be performed at the California State University Stanislaus Art Building, located at 1 University Circle, Turlock, CA.

The work specified herein requires the removal of the existing roof system comprised of multiple layers of fiberglass ply sheets with a granulated surface over wood fiberglass insulation over the building roof deck. There is asbestos containing material in the roof membrane that requires special handling. All flashings and counter flashing are also to be removed and replaced.

The new roof system, flashing sand counter flashings are specified herein and consist of a base bid and two (2) Alternate Bids as follows:

1. Base Bid: 60 mil fully adhered PVC membrane over siliconized gypsum barrier board embedded in approved adhesive over lightweight insulation concrete over structural concrete over metal pan.

2. Alternate No 1: 60 mil fully adhered PVC membrane over ¼:12 tapered polyisocyanurate roof insulation to achieve an average R-value of 19.00. Each layer of insulation is embedded in approved adhesive with the first layer adhered to lightweight insulating concrete over structural concrete over metal pan.

3. Alternate No. 2: 60 mil fully adhered PVC membrane over ¼:12 tapered polyisocyanurate roof insulation to achieve an average R-value of 30.30. The identical tapered insulation is installed over and adhered to two (2.0”) inch lightweight insulating concrete over structural concrete over metal pan.

The roof system(s) in all cases, require new flashings and counter flashings at walls and building perimeter as well as existing skylights. Carpentry work is required at roof perimeters. Provide 20 year NDL system Warrantee.

1.02 GENERAL SCOPE OF WORK

A. The Roofing Contractor and his Subcontractors shall furnish all labor, materials, equipment, transportation, supervision, permits, and incidentals required to safely and legally perform the work including, but not limited to: protection of property, removal and replacement of existing roof system with related flashings, sheet metal, sealant work, related mechanical and electrical, and other incidentals.

B. It is the intent of the contract documents to include everything necessary and required for proper completion of the work. All work is to be performed as required to carry out the intent whether or not each individual item is specifically stated.

C. All work shall be performed in accordance with contract documents, manufacturer requirements, State, Local, and Federal requirements, and fire official requirements.

D. Work shall be performed between June 8 and August 6, 2010.

E. Sixty (60) calendar days shall be allowed for the completion of this project. The time of completion shall commence as directed by the University in the Notice to Proceed issued
after the receipt of the fully executed Agreement. The project must be completed in all respects in accordance with the Contract Documents to the full satisfaction of the University within the noted calendar days or liquidated damages in the amount of $500.00 per calendar day shall be assessed. Refer to item 7.02 of the General Condition for additional information.

1.03 CONTRACTOR RESPONSIBILITIES

A. Contractor shall carefully compare and study the specifications, drawings and all other applicable contract documents. No "extras" shall be allowed for any errors, discrepancies, or omissions that Contractor failed to report prior to award of the contract.

B. Contractor shall tour the project sufficiently, prior to the bid, to adequately bid the project, taking into consideration project delays and slower production due to compliance with all applicable precautionary measures.

C. Failure to examine the site and to become familiar with the existing conditions shall not constitute cause for complaint or claim for extra payment. Accept project site as it exists.

D. The Contract Documents have been checked by the Owner, and to the best of his knowledge and belief, are reasonably free from errors, omissions, conflicts, inconsistencies, code violations, and improper use of materials. The Contractor shall carefully study and compare the Contract Documents, and at once report any error, omission, conflict, inconsistency, or code violation he may discover.

E. Contractor shall notify the Owner of any condition not acceptable by the roof material manufacturer that may affect the final roof performance.

1.04 SITE SPECIFIC SCOPE OF WORK

A. The work of this contract includes, but is not limited to, the following work to be performed at the property located at Art Building, CSU Stanislaus in Turlock, California.

1. Clean roof surface of all debris, fasteners, etc.

2. Remove existing roof membrane, base flashings, roof insulation, flashings and counter flashings, as specified.

3. Install 60 mil fully adhered PVC membrane with proper accessories.

4. Provide 20 year NDL systems warranty.

5. Provide barrier board – Base Bid.

6. Provide 1/4":12" tapered insulation – Alt. No.1

7. Provide 1/4":12" tapered insulation over 2.0" insulation – Alt. No.2

8. Provide specified sheet metal and PVC clad metal flashings and counter flashings

9. Provide 5 year contractor warranty.

10. Provide/install pressure treated wood nailers and insulation strops.
11. Provide and install gutter.

12. Provide and install skirt flashings at skylights.

13. Provide and install factory boot flashings.

14. Provide and install walk pads at equipment and top of ladder.

15. Repair damaged LWIC on a unit price basis (per square foot).

16. Remove/replace existing wall counter flashing with 2 piece surface mount counter flashing; install one part urethane at receiver.

END OF SECTION
SECTION 01100

SUBSTITUTIONS

1.01 GENERAL

A. Whenever possible throughout the Contract Documents, the minimum acceptable quality workmanship and materials have been defined by manufacturer name and product designation, referenced to recognize industry and government standards, and/or description of required attributes and performance.

B. These Contract Documents have been prepared on the basis that only certain material standards shall be permitted for this project. The intent is not to limit competition but to allow for only those product standards that have been previously performed and found to be acceptable.

C. To ensure that the specific products are furnished and installed in accordance with design intent, the following procedures have been established for advance submittal of products and design data and for their review by the Owner.

1.02 PRODUCTS

A. In the event substitutions become necessary, the Contractor shall submit product data sheets and other complete manufacturer's literature on both the original product specified and the proposed product substitute. These shall be submitted with the bid for consideration.

B. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly indicate which portion of the contents is being submitted for review.

C. In order to qualify for acceptance, all products submitted for substitution must be determined as equal to, or better than, the original products specified. The submittal data required above shall clearly identify the physical and performance characteristics of both the original and proposed product for substitution.

D. Unless otherwise specified, submit one (1) sample of each product. Samples shall be of the precise article to be furnished.

1.03 ACCEPTANCE/REJECTION

A. The Owner shall make the final decision of acceptability of the proposed product substitution(s).

B. Any substitute products, which are used on this project without prior approval, shall be cause for rejection of the work. Any such work incorporating non-approved substitutions shall be removed and replaced with the original specified or other prior approved materials by the Contractor without additional costs to the Owner.

END OF SECTION
SECTION 01200

COORDINATION AND MEETINGS

1.01 COORDINATION OF WORK

A. The Contractor is responsible to properly, appropriately, and adequately coordinate and supervise the roof removal and the new roof installation, including the related work.

B. The responsibility for the coordination and completion of the work in accordance with contract documents is upon the primary awarded Contractor with whom the Owner enters into a contract for the work herein described. Such terms as "roofer" or "other contractors," "by others" and similar expressions shall be deemed to refer to the Contractor with whom the Owner entered into agreement.

C. No one shall assume or interpret that only manufacturer minimum requirements are followed. No reduction in scope of work is allowable due to statements made by any party without going through the proper change order process. The final decision shall be that of the Owner based on further consultation and/or consideration.

D. Contractor must maintain a full-time supervisor/foreman on the job site during times that roofing work is in progress. This person shall have a minimum of five (5) years experience in roofing work similar in nature and scope to specified roofing. The same person shall continue on the project through final acceptance, unless the person's performance on the project is not acceptably adequate or impedes project productivity.

1.02 SITE ACCESS AND AVAILABILITY

A. Bidders visiting the building for estimating purposes shall abide by the Owner's rules and regulations. Any and all job site conditions will be determined by the Owner.

B. Site will be available to Contractor upon receipt of the Owner's written notice to proceed, unless otherwise indicated in these specifications. Care, custody, and control of the site work area, equipment area, and material storage area are vested in the Contractor during the term of operations under the contract.

C. Failure to examine the project building and the site and to become familiar with the existing conditions shall not constitute cause for complaint or claim for extra payment. Accept project site as it exists.

D. Entrances or exits to or from buildings shall not be blocked for any reason. Fire protection and immediate access for fire-fighting equipment must be maintained at all times. Equipment and material storage areas are limited to those designated. Fencing of ground work area may be required to keep unauthorized personnel out of the area.

1.03 COORDINATION WITH OWNER

A. Work that might interfere with other trades shall be accomplished at a time approved beforehand by the Owner.
1.04 MEETINGS

A. **Pre-Bid Conference**: All parties are required to attend a mandatory Pre-Bid Conference at a date and time to be announced. The purpose of this meeting is to review job requirements, contract documents and existing conditions and to give parties an opportunity to ask questions and receive clarification. Failure to attend will be cause for rejection of bid.

B. **Pre-Job Conference**: Prior to beginning work, a Pre-Job Conference will be held at the job site. Those required to attend will be: the Roofing Consultant, the Roofing Contractor, the Sheet Metal and other applicable Subcontractors. An Owner's Representative will be present. Contractor will coordinate the date with the Roofing Consultant and coordinate the Pre-Job Conference so that all required parties are in attendance.

Attendees shall review all pertinent details and specifications, noting any potential problems and making any changes, deletions, or additions as deemed necessary. Also included in the discussion will be the following: nature and availability of coating materials, guarantee and submittal requirements, scheduling and forecast of weather conditions, regulatory requirements, protection of building, building components, and completed roof and coating systems; proposed installation procedures, and any additional items related to the total coating system.

Attendees shall tour representative areas of coating substrates (decks), and discuss substrate construction and general conditions, including deck slope and material compatibility.

No coating work shall commence nor material be delivered to the job site until after the Pre-Job Conference, review of minutes and acceptance by all parties.

C. **Punchlist and Final Inspection**: Upon completion of all specified work items, a Punchlist Inspection shall be performed with the following in attendance: Roofing Contractor, Owner, and any applicable Subcontractors. Any discrepancies or incomplete work shall be documented in a "punchlist" which will be issued to the Contractor. A follow-up final inspection shall be conducted if needed to confirm satisfactory completion of all punchlist items. A five (5%) percent retention will be withheld until completion and confirmation of all punchlist items as well as all other outstanding project requirements.

D. **Miscellaneous Meetings**: Meeting and attendees, as required by Owner.

END OF SECTION
1.01 SUBMIT PRIOR TO PRE-JOB CONFERENCE AND JOB START

A. List of all proposed materials, Manufacturers, and any Subcontractors.
B. Current product literature, installation specifications, and details.
C. Material Safety Data Sheets (MSDS) for all products containing "Hazardous Materials" as defined on lists issued by both the Federal and State governments. Maintain copies of MSDS sheets at the job site.
D. Any shop drawings required or requested.
F. Bid any performance bonds; as required.
G. Manufacturer approved applicator status letter for current year.
H. Any other requested items.

1.02 SUBMIT DURING PROJECT

A. Any shop drawings requested.

1.03 SUBMIT UPON COMPLETION, PRIOR TO PAYMENT OF FINAL RETENTION

A. Contractor Guarantee.
B. Manufacturer Guarantee.
C. Letter of certification stating that the products and installation performed on the project comply with contract requirements, that any punchlist items from the final inspection have been resolved and that the work is complete.
D. Landfill receipts from disposal of asbestos containing material.

END OF SECTION
QUALITY CONTROL

SECTION 01400

1.01 ROOFING CONTRACTOR’S RESPONSIBILITY AND FIELD OBSERVATION

A. Roofing Contractor shall possess/maintain, on site, a copy of specifications, MSDS sheets, postings in compliance with Proposition 65 warnings, related documents, all pertinent drawings, and any addendum information.

B. Nothing in the specifications shall be construed as relieving Roofing Contractor of responsibility for the waterproof quality, of the roofing work, or for compliance with other requirements.

C. It is Roofing Contractor’s responsibility to supervise their personnel and subcontractors and to assure the quality of application. Roofing Contractor shall provide all the tools, equipment, and personnel necessary to achieve this.

D. The presence of an Owner’s Representative or Field Observer is not to relieve Roofing Contractor of his quality assurance, but to examine it. Nothing contained herein or in other related documents implies, creates, or represents any contractual agreement or obligation between the Owner and/or Inspection Firm and Roofing Contractor.

E. Project quality control is the Roofing Contractor’s responsibility and obligation. Nothing contained herein or stated shall imply any obligation by the Owner to Contractor by performing such field observation, nor shall field observation relieve Contractor of any responsibility under the terms of the contract.

END OF SECTION
1.01 PROTECTION OF BUILDING, GROUNDS AND OCCUPANTS

A. Protect the building and the contents of the building from all risks resulting from the work. Roofing Contractor shall be sufficiently prepared to expediently install a temporary membrane to protect areas of torn-off or incomplete roofing in the event of rain.

B. Repair any damage that results from the work of this contract to Owner's satisfaction. Clean all floors, walls, walkways and other surfaces from stains, and protect all paving, landscaping and other site work from damage.

C. Roofing Contractor shall build and maintain barriers as are necessary for the protection of person and property passing by the construction site. All barriers, etc. for this purpose shall comply with all Federal, State and City ordinances.

D. Protect building contents and grounds during the process of the work. Protect all paving and buildings adjacent to hoist prior to starting work. Windows, doorways, docks, walkways, etc. may require special protection measures.

E. Provide fifteen (15) pound minimum-size fire extinguisher using an ammonium phosphate fire-fighting agent.

F. Provide special protection or avoid heavy traffic on completed work when ambient temperature exceeds eighty (80) degrees Fahrenheit.

G. Roofing Contractor must take every precaution to prevent interior leakage, materials from falling into the interior, or other such occurrences. Installation of materials shall be accomplished in such a manner that drippage does not occur.

H. The Roofing Contractor shall prevent access by the public to materials, tools, or equipment. The Owner assumes no liability or responsibility whatsoever for any damage, theft, or other acts which occur to the Roofing Contractor's material or equipment as a result of his negligence.

I. Cal-Osha approved perimeter warning and/or restraint system shall be used.

1.02 FACILITIES USAGE

A. The building is occupied.

B. Do not use the stairs or interior ladder within the building for movement of materials or equipment.

C. None of Roofing Contractor's personnel shall use the building facilities, or traffic through the building (unless pre-authorized) other than for:
   1. Interior protection.
   2. Necessary foreman contact with building personnel.
   3. Interior work.
4. Emergency services contact.

D. Smoking shall not take place while working nor while on roof. Smoking will only be permitted in designated areas.

E. No radios/boom boxes shall be allowed on the site.

F. Work hours will be determined by the Owner and strictly adhered to.

G. No loud noises or profanity allowed.

H. Work breaks shall only be taken in designated areas.

I. Coordinate all use with the Owner. At no time shall utilities be wasted. The Roofing Contractor shall discharge any worker creating a nuisance on the premises.

J. Use of the Owner's telephone will be at the discretion of the Owner and such use will be for business purposes only.

K. The Roofing Contractor shall provide adequate toilet of approved sanitary type. The Owner will not provide these facilities.

1.03 GROUNDS USAGE

A. Roofing Contractor usage of the ground areas (lot or surrounding) for staging material and equipment shall be designated by Owner.

B. No usage of grounds shall interfere with or cause the least interference to day to day building operations.

C. Other than immediate necessary trucks and equipment, all vehicles shall be parked in appropriate designated parking areas.

1.04 UTILITIES

A. Roofing Contractor shall be prepared to provide his own power as needed, or make necessary arrangements with the Owner.

B. Roofing Contractor shall not jump power from electrical boxes on the roof unless an electrician installs a proper, temporary, grounded receptacle in accordance with the National Electrical Code, and in accordance with OSHA and local building department requirements.

C. Any electric tools in use on the roof shall be protected by a Ground Fault Interrupter (GFI) circuitry which means adaptation of roof top power if used. All cords and electrical equipment shall be GFI grounded.

D. The Roofing Contractor shall not interrupt the utilities service for the building in any way unless agreed upon by the Owner.

1.05 ADJUSTING, CLEANING, AND RESTORATION

A. During the progress of this work, promptly remove any spills onto the exposed finished
surfaces and do not allow the accumulation of scrap and debris resulting from the work. Upon completion of the work, remove all excess materials from the job site. All clean-up work shall be performed to the satisfaction of the Owner at the sole expense of the Roofing Contractor.

B. Prior to final acceptance, the Roofing Contractor shall restore all areas affected by his work to their original state of cleanliness and repair all damage done to the premises, including the grounds, by his workmen and equipment.

C. Damage and Restoration:

1. Damage to materials, finishes, or structure caused by materials, movement of equipment or other operation related or associated with this project shall be restored or replaced as specified or directed by the Owner or Consultant, at no additional cost to the Owner.

2. Restoration shall be equal to the original look, and finishes shall match the appearance of adjacent surfaces. No free-fall of material is allowed.

D. Remove all debris daily from the roof. Use enclosed chute, crane and bucket, or construction hoist to minimize dust, dirt, and noise.

E. The Roofing Contractor shall return all improvements on or about the property, which are not shown to be altered, removed, or otherwise changed, to conditions which existed previous to starting work, or better.

F. The Roofing Contractor is responsible for any water damage to existing under deck insulation and building interior that may result from damage to the existing roof membrane, and for any subsequent water damage due to inadequate installation of water cut-off, etc.

G. The Roofing Contractor shall notify the Consultant if any seriously deteriorated structural member or decking is uncovered, prior to placement of new materials. Replacement of any deficient structural member, not specifically designated for replacement, will be at the decision and expense of the Owner.

H. Existing materials designated to remain, which are damaged or defaced or loosened as a result of the work and are unsuitable for the use intended, shall be replaced at the Roofing Contractor's expense, to the satisfaction of the Owner, if applicable.

I. Where necessary to remove or alter existing construction, all construction affected shall be properly patched and filled out to match existing or new work.

END OF SECTION
SECTION 01570

REGULATIONS AND SAFETY

1.01 PUBLIC AGENCIES

A. All work shall meet the requirements of all governing codes, ordinances, laws, regulations, safety orders, and directives relating to the work, including any specific requirements of the city and state of jurisdiction. This shall include the handling and disposal of any hazardous or potentially hazardous materials. The latest editions of standards and specifications listed herein shall apply to all procedures and materials used.

B. Any work on, adjacent to, or over public land, streets, alleys, or other public facilities, shall be approved by the proper authorities. The Roofing Contractor shall make his own arrangements with such authorities regarding all details, timing, materials, methods, protection, and similar items in connection with the work, including street use, work on such repairs, file bonds, conform to directions, and other such requirements that may be necessary.

1.02 SPECIAL CONTROLS

A. Disturbing or disruptive noise that interferes with the surrounding building occupancy will not be permitted except when scheduled in advance with the Owner. No smoking or loud radios, will be permitted on the roof. Smoking will be allowed in designated areas only.

B. The building interior, project site, and adjoining property must be protected from objectionable dust and wind-blown or falling debris.

C. Necessary controls shall be provided to prevent pollution of the air by odors or particulate matter. The location and operation of heating equipment shall be such that no hazard is created and objectionable odors are minimized.

D. Reasonable precautions must be exercised to prevent vandalism and to safeguard the public at the existing building, including on the roof. Openings shall not be left unprotected and materials shall be carefully stacked. Access to the roof must be controlled at all times so that no unauthorized person can get on the roof by use of the Roofing Contractor's equipment or materials, day or night.

E. Disposal of Materials:

1. All materials to be disposed of shall be loaded directly into trucks by means of approved methods that will prevent damage to existing or new surfaces and to control pollution.

2. No accumulation of materials to be disposed will be permitted at any time. The Contractor is responsible for prompt removal from the site and disposal in a manner accepted by the local authorities. This shall include any required precautions or requirements related to disposal of hazardous or potentially hazardous materials.
3. Disposal activities on the roof shall be limited to areas receiving a new roof system and no free-fall of debris into containers on lower roof areas is permitted. Enclosed chutes shall be required.

1.03 SAFETY

A. No means or methods shall be utilized in this contract that jeopardize safety to employees, the public or to the property. Roofing Contractor shall hold harmless and defend Owner and its Representative(s) for any violations, claims, or citations.

B. Roofing Contractor shall strictly comply with Federal OSHA or State OSHA, whichever has the strictest requirements or regulations. Contractor shall have and submit a written Safety Program. Including methods and means of addressing fall protection/restraint and/or perimeter warning system at roof perimeter.

C. Roofing Contractor shall provide for employee and public protection and be responsible for the erection, maintenance, supervision and dismantling of such safety compliances.

D. Roofing Contractors shall check with the local fire marshal and confirm and comply with all requirements pertinent to this project or as indicated herein.

E. No torches, flame, or anything that can cause combustion shall be used where the possibility of combustion exists.

1. Torches shall not be used on this project!

F. Dispose of all debris in a legal manner off the site. Safely direct debris to trucks or approved containers on the ground.

G. All debris shall be taken off the roof each night and drains cleaned and opened.

END OF SECTION
SECTION 01600

EQUIPMENT AND MATERIALS

1.01 MATERIAL DELIVERY/STORAGE

A. Liquid materials such as adhesives, thinners and cleaners shall be stored in areas away from sparks, open flames, and excessive heat. Positively **NO SMOKING OR OPEN FLAME** permitted in the area where solvents, adhesives, thinners or welding agents are present or being used. Caution shall be exercised at all times when working with solvent-type materials within the limitations described by the Manufacturers. Specific approval shall be obtained prior to storage of flammable materials. Refer to safety data sheets and OSHA requirements.

B. Deliver all roof system materials in original Manufacturer labeled packages with bills of lading to show Manufacturer. All roofing products shall bear Underwriter Laboratories (U. L.) labels. Materials shall be clean, dry, and free from damage and stored on pallets.

C. Delivery and storage of rolled goods shall be in closed vans, containers, or covered with tarps nightly. No materials shall be allowed to remain on the roof overnight unless set on pallets and fully protected with waterproof tarps. Any material left unprotected on the roof overnight shall be immediately removed from the site and replaced at the Contractor's expense with no exception.

D. Waterproof canvas covering shall be applied in a watertight manner and securely tied during and at the end of each working day. No holes or tears in the canvas shall be acceptable. Polyethylene covers are not acceptable.

E. The Manufacturer's product wrapping is not acceptable for site protection and storage. Factory or shipping wrap shall be side or end punctured/slashed or removed before covering with canvas.

F. Store rolled materials on end unless otherwise indicated by the Manufacturer. Any side stored, oblongated rolls shall be rejected for use.

G. Select and handle materials and equipment in such a way as to avoid damage to materials and existing roof construction. No storage of materials or traffic shall be allowed on completed roof.

H. Do not load or permit any part of a structure to be loaded with a weight that shall endanger its safety or cause damage. Confine equipment, storage of materials and debris, and the operations and movements of workers within the limits as indicated or as directed by the Owner or.

I. Storage of materials should not block any entranceways. Access to the building will be verified and coordinated with the Owner.

J. Roofing Contractor must take every precaution to prevent interior leakage, materials falling into the interior, or other such occurrences. Installation of materials shall be accomplished in such a manner that material drippage does not occur.
K. Any wet, damaged, or defective material shall be marked and removed from the job site by Roofing Contractor as soon as discovered. This material shall be promptly replaced at no cost to the Owner.

L. Verify that all materials are protected before, during, and after arrival at the job site. Verify that all materials have been adequately protected from moisture damage while in transit.

M. Any existing materials that are to be salvaged for reuse shall be removed carefully and stored in a manner and location to prevent damage until utilized.

END OF SECTION
SECTION 02075
----- ☛ -----
REMOVAL OF ASBESTOS CONTAINING ROOFING MATERIALS

1.01 CONTRACTOR CERTIFICATION

A. Contractor performing removal and disposal work shall have a Contractor's State Certification of Registration for Asbestos Related Work.

1.02 NOTIFICATION

A. Contractor shall notify, and furnish proof of notification to all appropriate parties, including, but not limited to, all Local, State, and Federal agencies regulating standards for the removal of asbestos containing materials, including, but not limited to:

1. CAL - OSHA.
2. FED - OSHA.
3. California Department of Health Services (DOHS).
4. California State Licensing Board.
5. The Local Air Quality Management District (SCAQMD).
6. Environmental Protection Agency (EPA).
7. Department of Building and Safety.
8. California Regional Water Quality Control Board.
9. The local county Solid Waste Division Sanitation District shall also be notified and written verification received from them indicating approval for disposing of asbestos felts in an ordinary landfill.
10. Notify university prior to demo. Air handlers will need to be shut down during ACM removal and building occupants will have to be notified.

B. Copies of all notification letters shall be submitted to the Roofing Consultant prior to start of work.

1.03 WORKER SAFETY

A. The Contractor shall provide each worker with a half-face respirator equipped with a NIOSH/MSHA approved permissible filter for dust, fumes, and mist with time weight average less than .05 milligrams per cubic meter and radionuclides. In addition, the Contractor will supply five (5) additional respirators, filters, and protective clothing for any visitors to the job site during the time that respirators are required. If it is found that fiber levels have increased during any phase of the project, then each worker shall be provided with respirator rated with the appropriate protection factor required for the fiber level.

B. The Contractor will ensure that there is always a sufficient supply of replacement filters, of the type described above, and that filters are changed after one (1) days work.
C. The Contractor will ensure that all of his employees that will be required to work while wearing a respirator are instructed on their proper use, including proper fitting, changing of filters, no eating/drinking/smoking, etc., while in the work area.

D. Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, meet the more stringent requirement:

1. OSHA - U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards 29 CFR 1910, Section 1001 and Section 1910.134. 29 CFR 1926.
3. NIOSH - National Institute for Occupational Safety and Health.
4. MSHA - Mine Safety and Health Administration.

E. Respirators will be required to be worn not only during the initial three (3) days of tear-off, but each day of asbestos removal activities.

F. If, after initial testing, results confirm that airborne fiber levels are above the EPA action level of 0.1 f/cc, all demolition, tear-off, or removal of asbestos containing materials shall cease, and not begin again until has reviewed the methodology and protocol used to conduct the test and recommends commencement of work or a further course of action to control fiber release.

1.04 ROOFING MEMBRANE DEMOLITION

A. Dampering of the tear-off material during removal will be required in an attempt to keep fiber levels below the recommended level of 0.1 fibers per cubic centimeter. The membrane may be cut or torn manually into manageable sizes. Power saws shall not be used for membrane cutting. The asbestos containing roofing materials will be separated from the roofing substrate and any other non-asbestos containing materials, then prepared for disposal.

1.05 DISPOSAL

A. Roofing material containing asbestos felts in a non-friable condition may be disposed of at any Class III waste disposal site that will accept it under the following conditions:

1. Prior notice given to the Appropriate Environmental Protection Agency regional office.
2. Prior notice and permit from Appropriate State and/or Local Agencies, including, but not limited to: Department of Health Services, California Regional Water Quality Control Board, local county Solid Waste Division/Sanitation District.
3. Prior documentation from a certified laboratory and an industrial hygienist
indicating that the material is non-friable.

B. The felts will be carried to the edge of the roof where off loading will take place, and lowered to the ground by forklift. The use of a fully enclosed chute may be acceptable if air monitoring indicates that airborne fiber levels are able to be kept within acceptable limits. The felts will be loaded into a dumpster or bin which can be completely enclosed and locked. A tractor trailer rig may also be used.

C. Advise the landfill operator of the quantity of material to be delivered.

D. Retain receipts from landfill operator for material disposed of, and submit copies to the Owner, as well as Job Manifest.

END OF SECTION
# Bulk Asbestos Analysis

## Final Report

**Client:** CRC CONSULTING GROUP, INC  
1400 Easton Drive Suite 138  
Bakersfield, CA 93309-  
**Attn:** HEATHER BOUTON

**Analysis Report No:** 219-2342  
**Date Received:** 2/10/2010  
**Date Examined:** 2/10/2010  
**Report Date:** 2/12/2010

**Job ID / Site:** CSUS ART BUILDING / TURLOCK, CA

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Comment</th>
<th>Lab Number</th>
<th>Layer Description</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MEMBRANE - FIELD</td>
<td>219-5006</td>
<td>BLACK TO GRAY</td>
<td>Chrysotile</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Composite Values of Fibrous Components:** Asbestos: (25%)  
Cellulose: (TRC%)  
Fibrous Glass: (ND%)  
Other: (ND%)

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Comment</th>
<th>Lab Number</th>
<th>Layer Description</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>MEMBRANE - FIELD</td>
<td>219-5007</td>
<td>BLACK TO GRAY</td>
<td>Chrysotile</td>
<td>35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Composite Values of Fibrous Components:** Asbestos: (35%)  
Cellulose: (3%)  
Fibrous Glass: (ND%)  
Other: (ND%)

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Comment</th>
<th>Lab Number</th>
<th>Layer Description</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>BASE FLASHING - VENT UNIT</td>
<td>219-5008</td>
<td>BLACK W BROWN</td>
<td></td>
<td>ND%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Composite Values of Fibrous Components:** Asbestos: (ND%)  
Cellulose: (25%)  
Fibrous Glass: (5%)  
Other: (ND%)

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Comment</th>
<th>Lab Number</th>
<th>Layer Description</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
<th>Asbestos Type</th>
<th>Pct Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>MASTIC - PENETRATION</td>
<td>219-5009</td>
<td>BLACK</td>
<td></td>
<td>ND%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Composite Values of Fibrous Components:** Asbestos: (ND%)  
Cellulose: (3%)  
Fibrous Glass: (TRC%)  
Other: (ND%)

---

**Supervisor:** W. Kirk Shelton  
(EPA Method 600/R-93116, Visual Area Estimation/ARB Method 435)

**Note:** Limit of Quantification (LOQ) = 1%  
"Trace" denotes the presence of material below the LOQ  
"ND" = None Detected
PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Work Included:

1. This section includes all labor, materials, equipment and related services necessary to furnish and install all roof related wood components required to complete the work specified herein and/or on the drawings, including the following:
   a. Wood Nailers.
   b. Wood Curbs and Platform Components and/or Extensions.
   c. Wood Blocking and Wood Cants.

B. Related Work Specified Elsewhere:

1. Section 02075 - Removal of Asbestos Containing Roof Materials
2. Section 07221 – Roof Insulation
3. Section 07531 – Single Ply TPO Roofing
4. Section 07620 - Roof Related Metal Work
5. All Division 1 Specifications and Contract General Conditions apply to the work of this section as fully as though repeated herein.
6. All Manufacturer's requirements including, but not necessarily limited to, pertinent portions of their specifications and general requirements and recommendations apply to the work of this section as fully as though repeated herein.

1.01 QUALITY CONTROL

A. Refer to Division 1, Section 01400 - Quality Assurance for general requirements pertaining to Quality Control.

B. Contractor shall be experienced and knowledgeable regarding Code requirements for carpentry work.

C. Alignment and elevation of installed wood will be checked by the Owner's Representative and by the Roofing Contractor.

D. Field tests may be required to evaluate moisture content of installed materials.
E. Contractor's personnel or subcontractor who will be performing the carpentry work shall attend the Pre-Job Conference.

1.02 SUBMITTALS

A. Materials list and/or product data for all wood and fasteners required by Division 1, Section 01300 - Submittals.

B. Submit shop drawings as needed for clarification of, or proposed changes to, details addressing wood components.

1.03 DELIVERY, STORAGE AND HANDLING

A. Handle and store materials in accordance with Division 1, Section 01600 - Equipment and Materials.

B. All lumber shall be delivered dry to the job site and stored in a covered manner.

C. All wet, broken, twisted, and cupped boards shall be removed from the site.

D. If stored on the roof, Contractor shall take precaution not to overload any single area.

E. Split, warped, or cupped boards shall not be installed.

1.04 JOB CONDITIONS

A. Existing construction may not be as shown on the drawings and some modifications of details may be required to accomplish the intent of the documents

B. Protection of, and repairs to, existing property shall be as stated in Division 1, Section 01500 - Protection and Use of Facilities.

1.05 REGULATORY REQUIREMENTS

A. Contractor is responsible to meet regulations of public agencies including any specific requirements of the City and State of jurisdiction.

B. Requirements for perimeter blocking shall, as a minimum, be in accordance with recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, June 1999.
PART 2 - PRODUCTS

2.01 LUMBER

A. Nominal Redwood Select Grade #1 or better, or pressure treated Douglas Fir #1 or better.

B. All lumber used shall conform to local and state requirements, and meet manufacturer requirements.

C. All lumber shall be stamped with the appropriate grade.

D. Moisture content for all lumber shall be fifteen (15%) percent or less at the time of roofing system installation.

E. Pressure treatment shall conform to AWPA Standard C1 and C2, using CBA Type A preservative such as Woolman E (Wolmanized Natural Select), non-arsenic treatment.

2.02 LUMBER (FRAMING)

A. Nominal Doug Fir Select Grade # 1 or Better.

B. All lumber used shall conform to Local, State, and Manufacturer requirements.

C. All lumber shall be delivered to site with appropriate grade stamp. All non-complying material shall be removed from the site.

D. Moisture content for all lumber shall be fifteen (15%) percent or less at the time of roofing system installation.

E. All lumber shall be like kind/dimension to existing, unless otherwise specified or detailed.

2.03 PLYWOOD

A. Structural 1, Exposure 1, Grade CD, APA labeled only; sizes as indicated or required, pressure treated.

B. Plywood shall meet requirements of the latest edition of U.S. Products Standard PSI for Soft Wood Plywood - Construction and Industrial.

C. Moisture content for all lumber shall be fifteen (15%) percent or less at the time of roofing system installation.

D. Pressure treatment shall conform to AWPA Standard C1 and C9, using CBA Type A preservative such as Woolman E (Wolmanized Natural Select), non-arsenic treatment.

2.04 FASTENERS

A. Lumber to lumber: Cement coated or annular threaded nails of sufficient length to penetrate 1-1/4" into adjoining members, except as otherwise indicated.
B. Plywood to lumber: Screw nails - size as required for minimum 1-5/8" penetration into or through wood member being fastened into. Screw nails shall have ICBO approval.

C. Plywood or lumber to concrete or masonry: Specially threaded anchors of sufficient length to penetrate concrete a minimum of 1-1/2", such as Tapcon, manufactured by Buildex, or an approved equal; or Spike type fastener such as Buildex Striker. Countersink anchors or use flat head type.

D. Plywood or lumber to steel: Minimum #10 sheet metal screw through 5/8" diameter steel washers.

E. Minimum coating requirement for fasteners and accessories shall be hot dip zinc, ASTM 153.
PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES

A. Curbs and nailers are to be used and added to where necessary, to achieve minimum height requirements of ten (10") inches above roof membrane surface.

B. Surfaces to receive new wood members shall be free of all dirt, debris, and loose materials. Exposed surfaces to be mechanically scraped, if necessary, to remove projections.

C. Surfaces are to have no free water present in any form (rain, dew, frost, snow, or ice).

D. The Contractor is responsible to inspect all exposed surfaces to see that conditions are satisfactory for installation of his work.

E. Fastening wood members must be inspected for conformance to requirements specified herein. Fastening found not in conformance must be upgraded to meet requirements specified herein.

3.02 GENERAL INSTALLATION

A. Perform entire work in accordance with code and the best standards of practice relating to the trade, and carefully plan and lay out the work as required. Properly accommodate the work of other trades. Accurately saw-cut and fit lumber into the respective locations, true to line, grade, and level, as indicated or required; and permanently secure in proper position with spikes, nails, lag screws, bolts, hangers, or other fastenings to render the same substantial and rigid securement in all parts and connections.

B. All blocking, cants and nailers are to be in straight lines and level planes and at proper elevation for installation of specified roof system.

C. Warped wood members are not to be used unless they can be fastened adequately to permanently hold them in their required alignment.

D. Plywood to lumber:
   1. For plywood roof sheathing, nail spacing at all edges to be six (6") inches on center with nail spacing at intermediate supports at twelve (12") inches on center.

E. Lumber to lumber:
   1. Nail spacing to be maximum twelve (12") inches on center and staggered across face of piece. Fastener also to be located within three (3") inches of each end of piece. Maximum spacing of six (6") inches on center, eight (8') feet each way from outside corners for roof edge blocking.
   2. Nail heads to be flush with wood surface and nail shall penetrate adjoining piece a minimum of 1-1/2".
3. The installed withdrawal resistance shall be a minimum of one hundred (100) pounds per nail.

F. Lumber or plywood to concrete or masonry:
   1. Anchor to be spaced a maximum of three (3') feet on center and staggered if lumber is more than five (5") inches wide.
   2. Head of anchor to be flat or countersunk flush with surface but no more than 1/3 the thickness of the fastened piece.
   3. Withdrawal resistance shall be a minimum of 400 lbs. per anchor or number of fasteners increased accordingly from that specified. Minimum penetration of 1-1/2" into the concrete.

G. Lumber or plywood to steel:
   1. Anchor to be spaced a maximum of two (2') feet on center and staggered if lumber is more than five (5") inches wide.
   2. Head of anchor to be flat or countersunk flush with surface but no more than 1/3 the thickness of the fastened piece.
   3. Withdrawal resistance to be minimum of four 400 lbs. per anchor or number of fasteners increased accordingly from that specified. Minimum penetration of 1/4" through the steel.

3.03 SPECIFIC WORK ITEMS
   A. Refer to Sections 07221 and 07531 and Roof Details for specific work items dealing with wood components.

3.04 CLEAN-UP
   A. Refer to Division 1, Section 01500 - Protection and Use of Facilities for requirements relating to cleaning and restoration.

END OF SECTION
SECTION 07221
----- ☼ -----
ROOF INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Scope of Work:

1. Installation of specified roof insulation(s).
   a. Flat board
   b. tapered

2. Fasteners and adhesive.

3. Roofing Accessories and Incidentals.

B. Related Work Specified Elsewhere:

1. Section 02075 - Removal of Asbestos Containing Roof Materials

2. Section 06100 - Rough Carpentry

3. Section 07531 – Single Ply Roofing

4. Section 07620 - Roof Related Metal Work

5. All Division 1 Specifications and Contract General Conditions apply to the work of this section as fully as though repeated herein.

6. All Manufacturer’s requirements including, but not necessarily limited to, pertinent portions of their specifications and general requirements and recommendations apply to the work of this section as fully as though repeated herein.

1.02 QUALITY ASSURANCE

A. Refer to Division 1, Section 01400 for General Requirements pertaining to Quality Control.

B. Contractor shall possess/maintain, on site, a copy of specifications, MSDS sheets, related documents, all pertinent drawings and any addendum information.

C. Roofing Foreman shall have a copy of these specifications on the job at all times during application and shall refer to same for proper application methods.


E. Contractor and Subcontractor shall be responsible for meeting fire regulations.

F. Whenever specification items found herein are less stringent than Manufacturers'
requirements, Manufacturers' requirements shall be followed.

G. Special precautions may be necessary when installing the roof system at temperatures below 45°F to insure satisfactory application and performance.

H. The responsibility for proper installation of all components of the roofing system lies with the Roofing Contractor. The Contractor shall inform the Owner of any conditions detrimental to the quality of construction or long-term performance of the roofing system and shall not proceed with the work until the conditions are corrected.

I. Contractor must maintain a full-time Supervisor/Foreman on the job site during times that roofing work is in progress. The Contractor selected for this work must have at least five (5) years experience in installation of comparable roofing systems to that proposed. He shall have a minimum of three (3) years documented approval by the primary Roofing Manufacturer, capable of providing the specified warranty(s).

J. Approved applicator by the membrane roofing system Manufacturer, and certified by the Manufacturer as having the necessary expertise to install the specific system.

K. Project Quality Control is the Contractor's and Subcontractor's responsibility and obligation. Nothing contained herein or stated shall imply any obligation by the Owner or his Representative(s) to Contractor and Subcontractor by performing such field observation, nor shall field observation relieve Contractor and Subcontractor of any responsibility under the terms of the contract.

L. Contractor and Subcontractor shall maintain internal quality control through instruction, supervisory inspection, and knowledgeable personnel for a proper installation without taking test cuts. This, however, does not limit the Owner's right to request cuts be taken by the Contractor and repaired as indicated by the Manufacturer and approved by the Owner.

M. The Subcontractor selected for this work must be approved by the primary materials Manufacturer, capable of providing the specified warranties.

N. The Contractor shall notify the Owner in a timely manner of the proposed start date of the work. Upon commencement of the work, the Contractor shall diligently and continuously pursue the project until completion. The Contractor shall employ sufficient labor and have proper equipment and materials on site so as to not cause any delay of any nature except as mentioned in the General Conditions.

1.03 REQUIRED MEETINGS

A. Pre-Job Conference:

1. Prior to beginning work, a Pre-Job Conference will be held at the job site. Those required to attend will be the Roofing Contractor, the Sheet Metal and other applicable Subcontractors, a Roofing Manufacturer Representative, the Owner. An Owner Representative may also be present. Contractor will coordinate the date with the Owner and coordinate the Pre-Application Conference so that all required parties are in attendance.

2. Attendees shall review all pertinent details and specifications, noting any potential
problems and making any changes, deletions, or additions as deemed necessary. Also included in the discussion will be the following: nature and availability of roofing materials, warrantee and submittal requirements, scheduling and forecast of weather conditions, regulatory requirements, protection of building, building components, and completed roof system; proposed installation procedures, and any additional items related to the total roof system.

3. Attendees shall tour representative areas of the roofs and discuss substrate construction, roof construction and general conditions including roof/ deck slope, expansion joints, supports, curbs and penetration installation, drain locations, rooftop equipment, flashing conditions, material compatibility, etc.

4. No roofing work shall commence nor material delivered to the job site until after the Pre-Job Conference, review of meeting notes and acceptance by all parties.

B. Periodic Inspection:

1. The Owner will monitor various phases of the work and provide written reports and photos for each site visit, indicating compliance with, or deviation from, Bid Documents. Corrective action for any deviation shall be accomplished in a manner prescribed by the Consultant and acceptable to the Owner at no cost to the Owner.

C. Punchlist Inspection:

1. A Punchlist will be developed by the Owner when work has been substantially completed. This written report will be the basis of conducting the Final Inspection. The Contractor shall promptly address those items identified and correct to comply with the specifications and details. The cost of repetitive Punchlist Inspections will be back charged to the Contractor.

D. Final Inspection:

1. Upon completion of all specified work items, a Final Roof Inspection shall be performed with the following in attendance: Roofing Contractor, Roofing Manufacturer’s Representative, Owner’s Representative and any applicable Subcontractors. Any discrepancies or incomplete work shall be documented in a "punch list" which will be issued to the Contractor. Five (15%) percent retention will be withheld until completion and confirmation of all Punchlist items as well as all other outstanding project requirements.

E. Miscellaneous Meetings: Meetings and attendees, as required by Owner

1.04 SUBMITTALS

A. Refer to Division 1, Section 01300 – Submittals – for other applicable submittal requirements.

B. Submit at Least One Week Prior to Pre-job Conference:

1. Samples:
   a) Roof Insulation
b) Barrier Board

2. Copy of Warrantee Application submitted to and initially approved by the Manufacturer. (See Section 07531)

3. Letter from Manufacturer stating roofing contractor is an approved applicator in current year.

4. Material Safety Data Sheets (MSDS) for all products containing "Hazardous Materials" as defined on lists issued by both the Federal and State governments. Maintain copies of MSDS sheets at the job site.

5. Approved Applicator Certification Letter(s) from Roofing Manufacturer documenting at least three (3) years of approval, including current approval.

6. Letter of Certification from the primary Manufacturer stating that the system specified or proposed is appropriate for the geographical area and type deck, that the specified requirements are either acceptable or exceed their requirements for the specified guarantees, and that the systems comply with specified UL and FM requirements. Any items not acceptable or detrimental to system performance shall be noted prior to bid for review and clarification.


8. Compliance with State Energy Commissions R-Value List.

9. Certification that proposed roof system will be installed to meet minimum FM I-90 requirements. ASCE 7-02 requirements and local code requirements, whichever is most stringent.

C. Submit During Project:

1. Any shop drawings or other requested information.

D. Submit Upon Completion for project Close-out:

1. Contractor Warranty

2. 20 year Manufacturer NDL Guarantee

3. Letter of Certification stating that the products and installation performed on the project comply with contract requirements, that any punch list items from the final inspection have been resolved and that the work is complete

1.05 REFERENCES

A. American Society for Testing and Materials (ASTM)


5. E84 Test Method for Surface Burning Characteristics of Building Materials

C. Manufacturer’s Current Applicable Specification Catalogs.
D. Factory Mutual (FM) Approval Guide and applicable Loss Prevention Data Sheets.

1.06 DELIVERY, STORAGE AND HANDLING

A. Wet materials shall not be applied nor shall roofing application proceed during wet weather or when moisture is on roof deck.

B. Deliver materials to jobsite on pallets in original, unopened packaging with legible labels. Package labels shall indicate product name, production date, product code and testing agency.

C. Store materials in dry, protected areas in upright position. When stored outdoors, store on pallets above ground and cover top and all sides with suitable protective sheet or tarpaulin. Do not double-stack pallets on the job site. Shrink-wrap packaging is not intended for long-term jobsite storage and shall be removed upon arrival at jobsite and replaced with a watertight breathable covering.

D. Select and handle materials and equipment in such a way as to avoid damage to materials, existing construction, or applied roofing.

E. Do not load or permit any part of structure to be loaded with a weight that will endanger its safety or cause damage. Confine equipment, storage of materials and debris and the operations and movements of workmen within any limits as indicated or as directed by the Owner or his Representative.

F. Contractor shall take every precaution to prevent interior leakage, materials falling into the interior, or other such occurrences. Installation of materials shall be accomplished in such a manner as to eliminate infiltration of, dust or debris into the building.

G. Any wet, damaged or defective material shall be marked and removed from the job site by Contractor that same day. This material shall promptly be replaced at no cost to the Owner.

1.07 FIRE AND WIND RATINGS

A. Underwriters Laboratories (UL) Class A
B. Factory Mutual (FM) Class 1-90 Fastening Patterns
C. UL, FM and Manufacturer labels shall be legible and affixed to each unit.

D. All ratings shall meet or exceed the above and/or comply with local codes; whichever is more stringent.

1.08 WARRANTEE

A. Work of this Section shall be covered under Contractor's Warranty as Specified in Section 07531.

B. Contractor's Warrantee Agreement:

1. For a five (5) year period from the date of completion and Owner acceptance, Contractor agrees to inspect and make necessary repairs to defects or leaks in the roof and flashings. Emergency leaks will be attended to within twenty-four (24) hours from receipt of notice from the Owner. As soon as weather permits, Contractor will restore affected areas to standards of this contract without voiding the Manufacturer Warrantee and repair any damages from these leaks without cost to the Owner, except for leaks caused by abuse to roof by others or by abnormal weather conditions such as lightning, severe hail, or other unusual climatic phenomena. This Warrantee must be submitted to the Owner, in writing, before final payment is released for the project.

C. Manufacturer Warrantee:

1. Submit to the Owner, Manufacturer's unlimited penal sum Warrantee covering any and all repairs/replacements to keep the roof, including the field and flashing, watertight for period of twenty (20) years beginning at the time of the Owner's acceptance of final product. Cost of this warrantee shall be borne by the Contractor.

2. This warrantee shall be executed by the primary Roofing Manufacturer to cover any and all costs for repairs necessary to stop leaks which occur resultant of, but not limited to, the following:
   a) Deterioration of the roofing membrane or base flashing system resulting from ordinary wear and tear by the elements.
   b) Workmanship on the part of the approved Roofing Contractor in application of the roofing membrane or base flashing system.
   c) Splits, cracks or fractures in the roofing membrane.
   d) Lap failure of the membrane.

3. If, 24 hours after notification of roof leakage Contractor has not responded, Owner shall have the right, without invalidating his Warrantees and at the expense of the Contractor, to make any emergency temporary repairs that are required in order to protect the building and its contents from damage due to roof leakage.

D. Pre-Lapse Inspection:

1. Prior to expiration of the Contractor's Warrantee, Contractor shall schedule an Inspection of the warranted roof by the Owner and Consultant. At this time, any defects noted shall be documented. Any defect falling within the Contractor's
Warranty liability shall be repaired by him prior to expiration of his Warrantee. Failure to make proper repairs within the Warrantee period shall result in extension of the Contractor’s Warrantee until acceptable completion of all applicable repair items.

1.10 PROTECTION

A. Protect the building and the contents of the building from all risks resulting from the work. Contractor shall be sufficiently prepared to expediently install a temporary membrane to protect areas of torn-off or incomplete roofing in the event of rain.

B. No staging of materials or equipment shall occur on finished roofing. Scheduling of work shall allow for commencement of roof installation at locations opposite roof access points, working in toward access/staging area, in order to accommodate this requirement.

C. Special care shall be exercised when trafficking is necessary over new recently installed roofing. Traffic over these roof areas shall be minimized whenever possible. Provide special protection measures when significant traffic is required over new roofing. The Contractor shall be responsible for patching of any existing surface or component not scheduled for replacement or alteration, which is damaged during any sequence of the work.

D. Contractor must take every precaution to prevent interior leakage, tear-off materials and new materials from falling into the interior, or other such occurrences during both roof removal and application of new materials.
PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER(S)

   A. This specification is based upon Johns Manville Insulations and is intended to establish material, performance and quality standards. Requests for substitutions shall be submitted to the Owner for review and consideration based on equivalence with specified products and compliance with specified requirements. The final decision on submittals is the Owners.

2.02 MATERIALS

   A. Roof Insulation:

      1. Material: Rigid, closed cell polyisocyanurate foam core bonded to fiberglass reinforced facers.


      4. Thermal Conductance Value (C): Varies

      5. Thickness per layer: Varies

      6. Total Resistance Value: R=Varies

      7. Alternate #1: ¼:12 Tapered to achieve R=19.00 (average)

      8. Alternate #2: 2.0 Flat + ¼:12 Tapered to achieve R=30.30 (average)

   B. Barrier Board (Base Bid):

      1. Material: Primed, Glass Mat Faced, Siliconized Gypsum Board.


      4. Thermal Conductance Value (C): 3.57

      5. Thickness: 0.25"

      6. Total Resistance Value (R): 0.28

   C. Adhesive:

      1. Type: Adhesive

      2. Manufacturer and Brand: Johns-Manville Moisture Cure Adhesive.

      3. Manufacturing Standard: N/A
4. Size: Continuous Ribbons 4” o.c.

2.03 SUMMARY OF INSULATION/ COMPONENTS

A. Insulation for Roofing:

1. Summary of materials per 100 square feet:
   a. Base Bid: Adhesive
      Dens Deck prime, 0.25” 100 Sq. Ft.
   b. Alt. Bid No. 1: Adhesive
      (Avg. R=19.00) ¼:12” Tapered insulation 100 Sq. Ft.

   OR

   c. Alt. Bid No. 2: Adhesive
      (Avg. R=30.30) 2.0” Board
      ¼:12” Tapered Insulation 100Sq. Ft.
PART 3 - EXECUTION

3.01 GENERAL APPLICATION REQUIREMENTS

A. Roofing shall not be applied unless correct application temperatures can be maintained to obtain good embedment and adhesion. Operations shall not be conducted when water in any form is present on deck, such as rain, dew, ice, frost, or snow. Water should be limited to containers for human consumption.

B. Precautions shall be taken to keep materials clean, dry and free of damage.

C. Do not start application of more materials each day than can be completed within the same day.

D. Start roofing work in dry weather only and without threat of immediate inclement weather. Keep the roofed area of the building watertight each day as the work progresses.

E. At the end of the day, edge-seal the finished portion of the roofing system completed that day with fabric or felt set into roof cement. Remove edge seals prior to the start of the next day’s work.

F. Use only materials and procedures that are proper and suitable for the slopes and for the underlying materials to which they are attached.

G. Approved and operable fire extinguishers shall be on hand at all times on the roof and near the point of application. All additional requirements of OSHA Safety Regulations will be followed.

H. Do not use any wet or damaged materials. Remove from the site.

I. All installed insulation or barrier board must be covered with the completed roof membrane system at the end of each days work. All roof terminations and openings shall be made waterproof at the end of each day’s work.

J. Phasing of roof membrane application or temporary membrane is not acceptable. Membrane, excluding surfacing, shall be installed in final form on a day-to-day basis. Failure to do so will require removal and replacement at no cost to Owner.

3.02 PREPARATION

A. Deck Preparation:

1. The deck shall be smooth, clean, dry, free of debris, and be sufficiently rigid to support the roofers and their mechanical equipment without deflection that will strain or rupture any of the roofing components.

2. Any significant depressions, holes, deformations, etc. shall be made smooth prior to roofing application. Dry sack all voids in LWIC with like material to create a uniform substrate.

3. Clean significant surfaces of debris and of moisture before proceeding with
application of roofing material.

4. Refer to Manufacturer's General Requirements for appropriate substrate requirements.

B. Deck Inspection:

1. Contractor will be responsible for insuring that the roof surface is clean, firm, smooth, adequately dry, properly secured against movement, and acceptable to the Manufacturer and to himself, prior to application of roofing materials.

2. The roof deck/structure shall meet FM and ASCE 7-02 requirements.

3. The roof deck/structure shall meet FM and ASCE 7-02 requirements.

4. The roof deck shall be closely inspected for:
   a. Proper adhesive schedule.

5. Commencement of roof application over any section will denote acceptability by Contractor of any section's readiness to receive roofing and he will be responsible for any corrective work which may be occasioned by his having started over an unsatisfactory surface.

C. Thoroughly clean and seal all exposed metal joints and penetrations to result in a watertight seal.

D. Create sump areas around drains, minimum 30"x60" using insulation thickness. Install tapered insulation, as required.

3.03 INSTALLATION

A. Any proposed changes to details shall be submitted to Consultant for approval prior to commencement.

B. Refer to Sections 02075, 06100, 07531 and 07620 for additional installation requirements.

3.04 APPLICATION OF ROOF INSULATION/BARRIER BOARD

A. Roof insulation and barrier board shall be applied with edges parallel to the walls.

B. All Insulations and barrier board with all joints offset minimum twenty four (24") inches between layers and minimum staggered joints of twenty four (24") inches.

C. 1st Layer: Insulation boards shall be laid dry in an ashlar pattern (joints staggered) with the joints between the long dimension of the boards continuous attachment of insulation shall be accomplished by adhering insulation to the deck and with adhesive at subsequent layers.

D. Create drain sumps, minimum 30"x30" for primary drain and 30"x60" for primary/overflow drains, use thickness of insulation to create sumps.
BOARD SIZE*  
2' X 4'  4' X 4'

Rows of Adhesive  
4" o.c.  4" o.c.

* Insulation boards shall not be larger than 4'x4'.

E. All layers shall be embedded into uniform rows of adhesive 4" o.c. Joints shall be offset and board fully embedded.

F. Space roof insulation 1/4" from all vertical flashings.

G. Insulation shall be neatly cut and fit around all through-roof projections.

H. Insulation shall be fastened with appropriate adhesive, as required to comply with FM I-90, or as required.

I. No more insulation shall be laid than can be completely covered in a day's work.

J. Remove and replace any wet insulation. Roofing shall not be applied over wet insulation.

K. Fill all holes created by broken insulation or replace with unbroken board.

3.05 INSTALLATION

A. Any proposed changes to details shall be submitted to Owner for approval prior to commencement.

B. Refer to Section 07531 and Roof Details for additional installation requirements.

3.06 CLEAN UP

A. Contractor shall remove all markings from finished surfaces. He is to keep premises clean and free from accumulations of waste materials and rubbish at all times. He shall remove all debris, scrap, and rubbish from the work area daily. Surplus materials and all equipment shall be promptly removed from the site upon completion of the work. Prior to final acceptance, the Contractor shall restore all areas affected by his work to their original state of cleanliness and repair all damage done to the premises, by his workman and equipment.

END OF SECTION
SECTION 07531

PVC SINGLE-PLY ROOFING – FULLY-ADHERED

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope of Work: (Reference Section 01010 - Work of Summary)
   1. 60 mil Fully-adhered PVC Roofing Membrane over Barrier Board or Roof Insulation over LWIC over Structural Concrete over Metal pan
   2. Membrane and/or Metal Flashing and Counter Flashing
   3. Roofing Accessories and incidentals

B. Related Work Specified Elsewhere:
   1. Section 02075 – Asbestos containing materials
   2. Section 06100 – Roof Related Wood Components
   3. Section 07221 – Roof insulation and Barrier Board
   4. Section 07620 - Roof Related Metal Work
   5. All Division 1 Specifications and Contract General Conditions apply to the work of this section as fully as though repeated herein.
   6. All Manufacturer's requirements including, but not necessarily limited to, pertinent portions of their specifications and general requirements and recommendations apply to the work of this section as fully as though repeated herein. However, these shall be considered as minimum requirements and shall not supersede more stringent requirements stated herein.

1.02 QUALITY ASSURANCE

A. Refer to Division 1, Section 01400 for general requirements pertaining to Quality Control.

B. Contractor shall possess/ maintain, on site, a copy of plans and specifications, MSDS sheets, related documents, all pertinent drawings and any addendum information.

C. Roofing Foreman shall have a copy of these specifications on the job at all times during application and shall refer to same for proper application methods.


E. Contractor and Subcontractor shall be responsible for meeting fire regulations. A certified fire extinguisher of adequate size shall be located on the roof and elsewhere as required.

F. Whenever specification items found herein are less stringent than Manufacturers’ requirements, Manufacturers’ requirements shall be followed.

G. Special precautions may be necessary when installing the roof system at temperatures below 45°F to insure satisfactory application and performance.
H. The responsibility for proper installation of all components of the roofing system lies with the Roofing Contractor. The Contractor shall inform the owner of any conditions detrimental to the quality of construction or long-term performance of the roofing system and shall not proceed with the work until the conditions are corrected.

I. Contractor must maintain a full-time Supervisor/Foreman on the job site during times that roofing work is in progress. The Contractor selected for this work must have at least five (5) years experience in installation of comparable roofing systems to that proposed. He shall have a minimum of three (3) years documented approval by the primary Roofing Manufacturer, capable of providing the specified guarantee(s).

J. Approved applicator by the membrane roofing system Manufacturer, and certified by the Manufacturer as having the necessary expertise to install the specific system.

K. Project Quality Control is the Contractor’s and Subcontractor’s responsibility and obligation. Nothing contained herein or stated shall imply any obligation by the Owner or Representative(s) to Contractor and Subcontractor of any responsibility under the terms of the contract.

L. Contractor and Subcontractor shall maintain internal control through instruction, supervisory inspection, and knowledgeable personnel for a proper installation without taking test samples. This, however, does not limit the Owner’s right to request testing by the Contractor and repaired as indicated by the Manufacturer and approved by the Owner.

M. The Subcontractor selected for this work must be approved by the primary materials Manufacturer, capable of providing the specified guarantees.

N. Installation Contractor’s Qualifications:

1. Installation contractor and crew shall be an approved installer, certified by the Manufacturer before the beginning of installation of the roof system. Certification by Manufacturer must include the following:

   a) Maintain general liability coverage for each loss.
   b) Maintain sufficient worker’s compensation coverage as mandated by law.
   c) Have no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.
   d) Has not filed for protection from creditors under any State or Federal insolvency or debtor relief statues or codes.
   e) Project foreman is the person having received specific training in the proper installation of the specified system and will be present to supervise whenever material is being installed. Specific training program shall include the following:

      (1) The instructor must have a minimum of 10 years’ experience.
      (2) A formal curriculum.
      (3) Classroom instruction with review and thorough understanding of the specific product’s technical manual.
(4) Hands-on mock-up instruction with a review and thorough understanding of the specific product’s details.

(5) The installer must pass a written and oral exam.

f) Provide five references from five different architects or building owners for projects that have been in service for a minimum of two years, stating satisfactory performance by the installer.

g) Provide certification letter that installer has a minimum of three years of PVC Roofing product installation experience immediately preceding the date upon which work is to commence.

1.03 SUBMITTALS

A. Refer to Division 1, Section 01300 – Submittals – for other applicable submittal requirements.

B. Submit at Least One Week Prior to Pre-job Conference:

1. Samples:
   a) Roof Insulation
   b) Barrier Board

2. Copy of Warantee Application submitted to and initially approved by the Manufacturer. (See Section 07531)

3. Letter from Manufacturer stating roofing contractor is an approved applicator in current year.

4. Material Safety Data Sheets (MSDS) for all products containing "Hazardous Materials" as defined on lists issued by both the Federal and State governments. Maintain copies of MSDS sheets at the job site.

5. Approved Applicator Certification Letter(s) from Roofing Manufacturer documenting at least three (3) years of approval, including current approval.

6. Letter of Certification from the primary Manufacturer stating that the system specified or proposed is appropriate for the geographical area and type deck, that the specified requirements are either acceptable or exceed their requirements for the specified guarantees, and that the systems comply with specified UL and FM requirements. Any items not acceptable or detrimental to system performance shall be noted prior to bid for review and clarification.


8. Compliance with State Energy Commissions R-Value List.

9. Certification that proposed roof system will be installed to meet minimum FM I-90 requirements. ASCE 7-02 requirements and local code requirements, whichever is most stringent.

C. Submit During Project:
1. Any shop drawings or other requested information.

D. Submit Upon Completion for protect Close-out:
   1. Contractor Warranty
   2. 20 year Manufacturer NDL Warranty
   3. Letter of Certification stating that the products and installation performed on the project comply with contract requirements, that any punch list items from the final inspection have been resolved and that the work is complete

1.04 REFERENCES
A. American Society for Testing and Materials (ASTM) applicable standards.
C. Factory Mutual (FM) Approval Guide and applicable Loss Prevention Data Sheets.
D. Manufacturer's Current Applicable Roofing Specifications Catalog.
E. “Wind Design Guide for Low-Sloped Flexible Membrane Roofing Systems” published by the SPRI which incorporates current ASCE 7-98 (American Society of Civil Engineers) wind speed tables

1.05 DELIVERY, STORAGE AND HANDLING
A. Wet materials shall not be applied nor shall roofing application proceed during wet weather or when moisture is on roof deck.
B. Deliver materials to jobsite in original, unopened packaging with legible labels. Package labels shall indicate product name, production date, product code and testing agency.
C. Store materials in dry, protected areas in upright position. When stored outdoors, store on pallets above ground and cover top and all sides with suitable protective sheet or tarpaulin. Do not double-stack pallets on the job site. Shrink-wrap packaging is not intended for long-term jobsite storage and shall be removed upon arrival at jobsite and replaced with a watertight breathable covering.
D. Select and handle materials and equipment in such a way as to avoid damage to materials, existing construction, or applied roofing.
E. Do not load or permit any part of structure to be loaded with a weight that will endanger its safety or cause damage. Confine equipment, storage of materials and debris and the operations and movements of workmen within any limits as indicated or as directed by the Owner.
F. Contractor shall take every precaution to prevent interior leakage, materials falling into the interior, or other such occurrences. Installation of materials shall be accomplished in such a manner that material drippage does not occur.
G. All materials must be protected from damage during transit, handling, storage, and installation.
H. Adhesive shall be stored at temperature between 50°F and 80°F and away from direct sunlight.
I. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined by material manufactured/ supplier.

J. Any wet, damaged or defective material shall be marked and removed from the job site by Contractor that same day. This material shall promptly be replaced at no cost to the Owner.

1.06 FIRE AND WIND RATINGS

A. Underwriters Laboratories (UL) Class A
B. Factory Mutual (FM) Class 1-90 Fastening Patterns
C. UL, FM and Manufacturer labels shall be legible and affixed to each roll.
D. “Wind Design Guide for Low-Sloped Flexible Membrane Roofing Systems” published by the SPRI which incorporates current ASCE 7-98 (American Society of Civil Engineers) wind speed tables and current ASCE 7-02 requirements.
E. All ratings shall meet or exceed the above and/or comply with local Codes; whichever is more stringent.

1.07 WARRANTY

A. Contractor's Warranty Agreement:
   1. For a five (5) year period from the date of completion and Owner acceptance, Contractor agrees to inspect and make necessary repairs to defects or leaks in the roof and flashings. Emergency leaks will be attended to within twenty-four (24) hours from receipt of notice from the Owner. As soon as weather permits, Contractor will restore affected areas to standards of this contract without voiding the Manufacturer warranty and repair any damages from these leaks without cost to the Owner, except for leaks caused by abuse to roof by others or by abnormal weather conditions such as lightning, severe hail, or other unusual climatic phenomena. This Warranty must be submitted to the Owner, in writing, before final payment is released for the project.

B. Manufacturer Warranty:
   1. Submit to the Owner, Manufacturer's unlimited penal sum warranty covering any and all repairs/replacements to keep the roof, including the field and flashing, watertight for period of Twenty (20) years beginning at the time of the Owner's acceptance of final product. Cost of this Warranty shall be borne by the Contractor.
   2. This Warranty shall be executed by the primary Roofing Manufacturer to cover any and all costs for repairs necessary to stop leaks which occur resultant of, but not limited to, the following:
      a) Deterioration of the roofing membrane or base flashing system resulting from ordinary wear and tear by the elements.
      b) Workmanship on the part of the approved Roofing Contractor in application of the roofing membrane, base flashing system and roof insulation/barrier board.
      c) Splits, cracks or fractures in the roofing membrane.
C. If, 24 hours after notification of roof leakage Contractor has not responded, Owner shall have the right, without invalidating his Warranty and at the expense of the Contractor, to make any emergency temporary repairs that are required in order to protect the building and its contents from damage due to roof leakage.

D. Pre-Lapse Inspection:

1. Prior to expiration of the Contractor’s Warranty, Contractor shall schedule an Inspection of the warranted roof by the Owner and Consultant. At this time, any defects noted shall be documented. Any defect falling within the Contractor’s Warranty liability shall be repaired by him prior to expiration of his Warranty. Failure to make proper repairs within the Warranty period shall result in extension of the Contractor’s Warranty until acceptable completion of all applicable repair items.

1.08 PROTECTION

A. Protect the building and the contents of the building from all risks resulting from the work Contractor shall be sufficiently prepared to expediently install a temporary membrane to protect area of torn-off, opened-up or incomplete roofing in the event of rain.

B. No staging of materials or equipment shall occur on finished roofing. Scheduling of work shall allow for commencement of roof insulation at locations opposite roof access points, working in toward access/ staging area, in order to accommodate this requirement.

C. Special care shall be exercised when trafficking is necessary over new recently installed roofing. Traffic over these roof areas shall be minimized whenever possible. Provide special protection measures when significant traffic is required over new roofing. The Contractor shall be responsible for patching of any existing surface or component not scheduled for replacement or alteration, which is damaged during any sequence of the work.

D. Contractor must take every precaution to prevent interior leakage, tear-off materials and new materials from falling into the interior, or other such occurrences during both roof removal and application of new materials.
PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER(S)

A. This specification is based upon providing and installing 60 mil, Fully-Adhered reinforced PVC roof to establish intended material, performance and quality standards. PVC membrane over insulation/ barrier board. Equivalent products by other Manufacturers shall be considered as “or equal” with written approval only.

B. TPO IS NOT ACCEPTABLE

2.02 MATERIALS

A. Roofing System:
   1. The single ply roofing system shall be comprised of the following major components and have UL Class A fire rating.

B. Roof Membrane:
   1. PVC (Polyvinyl-Chloride) Material: Nominal 60 mil (0.060") thick polyester-reinforced prefabricated sheet membrane. Prefabricated "half sheets" shall be provided as required for perimeter securement.
   2. Manufacturer and Brand: Johns-Manville PVC – Ultra Guard.
   3. Nominal Weight: 44 lbs. per 100 sq. ft.
   4. Exposed Color: White (Title 24 Compliant)

C. Membrane Adhesive:
   1. Material: Contact adhesive used to secure membrane in place. Do not use on seams.
   2. Manufacturer and Brand: Johns-Manville standard product.

D. Flashing Membrane:
   1. Material: Nominal 60 mil (0.060") thick reinforced PVC as required by manufacturer for application.
   2. Manufacturer and Brand: Manufacturer's standard product.
   3. Exposed Color: White

E. Fasteners for Wood and Masonry Flashings:
   1. Type: Wood nails shall be minimum 11 gauge, barbed, galvanized with 5/8" head. Masonry nails shall be case hardened. One-inch diameter tin caps must be used.
   2. Manufacturer: Submitted and approved Manufacturer.

F. Metal Flashing:
   1. Refer to Section 07620 for metal flashing requirements and PVC clad metal.

G. Bonding Adhesive:
1. Material: Contact adhesive used to secure flashing membranes in place. Do not use on seams.

2. Manufacturer and Brand: Johns-Manville standard product.

H. Miscellaneous Accessories:

1. Lap sealants, caulking compounds, primers, solvents, overnight seal, separator sheets, protection pads, etc. to be as required, supplied and/or approved by the primary membrane manufacturer.

2. All sealant for membrane and metal shall be one (1) part urethane.

2.03 PRECAUTIONS

A. Do not use roofing systems products near fire or flame. Do not use open flames to expedite drying of surfaces, sealants or adhesives.

B. Avoid breathing vapors of solvent, sealant, and adhesives. Use of adequate ventilation is required. Avoid prolonged contact with solvents, sealants and adhesives with skin.

C. Do not paint PVC clad metal or membrane with oil based paint.

D. Do not allow muratic acid used to clean masonry to come in direct contact with PVC roofing membrane.
PART 3 - EXECUTION

3.01 GENERAL APPLICATION REQUIREMENTS

A. If installation of PVC Fully-Adhered system occurs during cooler weather it is recommended that liquids such as solvents, sealants, etc. be stored at temperatures warmer than 50°F or more but not to exceed 80°F until just prior to use in order to facilitate installation.

B. Precautions shall be taken to keep materials clean, dry and free of damage and out of direct sunlight.

C. Do not start application of more materials each day that can be completed within the same day.

D. Start roofing work in dry weather only and without threat of immediate inclement weather. Keep the roofed area of the building watertight each day as the work progresses. All membrane seams, roof terminations and openings shall be made waterproof at the end of each day’s work. Probe laps daily.

E. At the end of each day, edge-seal the finished portion of the roofing system completed that day according to manufacturer’s recommendations. Remove edge seals prior to the start of the next day’s work.

F. Use only materials and procedures that are proper and suitable for the slopes and for the underlying materials to which they are attached.

G. Operations shall not be conducted when water in any significant form is present on deck, such as rain, dew, ice, frost, or snow.

H. Approved and operable fire extinguishers shall be on hand at all times on the roof. All additional requirements of OSHA Safety Regulations will be followed.

I. Start roofing work in dry weather only and without threat of immediate inclement weather. Keep the roofed area of the building watertight each day as the work progresses. All membrane seams, roof terminations and openings shall be made waterproof at the end of each day’s work.

3.02 PREPARATION

A. The deck and membrane surface shall be clean and free of defects, and otherwise conditioned to conform to the requirements for an acceptable substrate for the roofing system and roof repairs.

B. Any significant depressions, holes, deformations, etc. shall be made smooth prior to new roofing application.

C. The membrane surface shall be swept free of significant debris or other foreign material.

D. NOTE: POWER, UTILITIES, ETC. SHALL NOT BE INTERRUPTED WITHOUT PRIOR COORDINATION WITH, AND APPROVAL FROM, THE OWNER.

3.03 SUBSTRATE CONDITIONS

The following general conditions apply to the substrate that will receive PVC Fully-Adhered system for Re-roofing:
A. The roof deck must be structurally sound to provide proper securement for adhesives. Areas showing a loss of integrity due to corrosion, rotting, warping, concrete spalling, fastener removal, etc., must be repaired or replaced prior to installing the roof system.

B. Contact the manufacturer if the location is subject to high levels of humidity and/or corrosion. Special details and/or fasteners may be required.

C. To prevent delays or interruptions in construction work must be coordinated with other trades and suppliers to insure that systems to be integrated with roofing and adequate supplies are available as the work progresses.

3.04 MEMBRANE INSTALLATION

A. Unroll membrane and position without stretching the membrane. Allow the membrane to relax at least 15 minutes when the temperature is above 60°F, prior to installation. Inspect for any damaged membrane. Remove sections of membrane that are creased or damaged.

B. Cut sheets to maximum size possible in order to minimize seams. Membrane shall be installed so that the flow of water is over or parallel to, but never against, the laps.

C. TPO membrane must be Fully-Adhered at all peaks, valleys, and slope intersections where the net change in slope exceeds 1-1/2:12. Contact the manufacturer for specific recommendations.

D. Application Precautions:
   1. No adhesive shall be applied to lap areas that are to be welded. All sheets shall be aligned to provide adequate lap area as required by welding techniques.

E. Welding of Lap Areas:
   1. Roofing membrane is to be hot air welded only.
   2. All surfaces to be welded shall be clean and dry.
   3. No adhesive shall be present within lap areas.
   4. Temporary “tack-welding” will not be allowed.
   5. Machines for hot air welding are available from several different sources. Each manufacturer’s instructions for use shall be followed, as well as all local codes regarding electrical grounding, supply and other related functions. Since most automatic welding machines require 218 to 230 volts, the use of a portable generator on the roof is recommended for greater flexibility.
   6. Hand-held welding machines are also available to weld membrane. After the preheated nozzle top is applied in the overlap area and the material starts to flow, immediately follow with a hand roller to press the heated membrane surfaces together with slow, even movements. Keep the roller within one inch of the nozzle top. Angle the hot air tool so that the flowing air faces the roller. The temperature of the hot air tool shall be adjusted so that a minimum of smoke is developed and material from the bottom of the sheet begins to soften and flow from the seam. Seam strength may be tested when cool. For best results, testing seams eight hours after hot air welding is recommended.

F. After heat welding, the seams are checked with a blunt-ended probe. Any openings or “fishmouths” shall be repaired with hand-held hot air tool fitted with a narrow nozzle top.
and with a roller. Each day, several sections of welded seams shall be pulled apart by the roofing contractor to test the quality of the welds. Should the welds be found deficient, a more thorough examination of the work must be conducted and necessary repairs made.

G. Any areas where the integrity of the weld is suspect, or where membrane defects occur such as fishmouths, wrinkles, punctures or voids in the seam area, shall be patched using the same membrane material. Using a rounded patch sized to extend at least six inches beyond the defect in all directions, prepare and patch the area in accordance with manufacturer’s instructions.

3.05 WATERSTOPS
A. Install temporary cutoffs around incomplete edges of roofing assembly at the end of each day’s work and when work must be postponed due to inclement weather. Seal the sheet membrane to the deck or existing membrane. Use a heavy application of roof cement at least six inches in width overlaid with an embedded reinforcement. Remove the temporary seals completely when work resumes, cutting out the contaminated membrane. Remove all sealant, contaminated membrane, etc. from the work area and properly dispose off-site.

3.06 FLASHING INSTALLATION
A. Metal Flashing:

1. Refer to section 07620 for sheet metal clad metal requirements.

B. Membrane Flashings:

1. Extend horizontal field membrane to the base of vertical surface at walls, curbs, pipes, etc., and cut even. Secure the membrane along the base of walls and around roof penetrations, curbs, etc., using appropriate fasteners placed at 12” o.c.

2. At curbs and walls, install flashing sheet extending from at least 4 ½ inches out over the field membrane, up vertical surfaces (where possible, extend over the top of curbs or walls and down over the opposite face). Install reinforcing “boots” at inside and outside corners as required. Use appropriate separator sheet when existing surfaces have asphaltic materials present.

3. Where PVC clad metal is used, secure flanges using appropriate fasteners placed at 6” o.c., staggered, and extend membrane at least three inches over the metal with a minimum 1-½” weld. Extend field membrane onto the entire horizontal portion of the metal, providing a minimum 1-½” continuous weld.

4. At pipes and similar penetrations, extend appropriate flashing membrane at least five inches onto the field membrane. Create minimum one-inch turn-up of membrane at pipes and overlap with vertical sleeve formed from appropriate flashing membrane. Pre-fab pipe boots may be used only if they meet minimum 8” height requirement or are extended as needed.

5. Internal roof drains require a double layer of flashing membrane welded together, extending from under the drain clamping ring, out onto the roof. This double membrane layer is secured with appropriate fasteners placed at 12” o.c. around the drain, then overlapped by the field membrane, providing a continuous weld at the overlap.
6. Provide a continuous weld where the flashing membrane overlaps the field membrane. Where clad metal is used, weld membrane directly to coating on clad metal.

7. Where asphalt residue occurs on curbs, walls, etc., provide appropriate asphalt barrier behind the flashing membrane or use clad metal. Otherwise, membrane can be fully adhered to vertical surface using appropriate bonding adhesive. Secure top surface of membrane flashing with appropriate fasteners at 12" o.c. Where unbonded membrane flashing terminates on the vertical, a 3" wide strip of welded PVC clad metal must be used in conjunction with top surface fasteners.

8. Fasten the top edge of membrane flashings at curbs, walls, etc., approximately every 12" inches on center with appropriate fasteners through one-inch diameter metal discs. Clamp the top edge of pipe flashing sleeves over an additional cushion strip and apply appropriate sealant along the top edge.

9. At roof drains, apply appropriate sealant between the drain rim and the field membrane and between the flashing membrane and clamping ring. Secure clamping ring tightly over both membranes and re-install strainer dome.

10. All flashing shall be in accordance with Roof Details and/ or manufacturers instructions. Where alternative flashing methods exist, these will be considered upon submission and acceptance of appropriate shop drawings. Where flashing requirements vary from those described herein or on details, submit shop drawings to describe proposed detail modifications prior to job start.

3.07 MISCELLANEOUS WORK ITEMS

A. Refer to Section 07620 for general requirements relating to metal components.

B. Provide and install 24-gauge metal counterflashing at reglet assembly in accordance with Section 07620.

C. Install new 2-piece spring-loaded 24 gauge clad metal edge flashing along perimeter wall conditions. Secure top horizontal flange of edge flashing to wood nailing as described above for clad metal flashing. Install membrane under and over flange and provide continuous weld to seal field membrane to clad metal. Secure outside edge of flashing using a 22-gauge metal continuous clip secured at 12" on center.

D. Provide and install membrane or clad metal transitions at edge and wall transitions/ terminations. Secure and seal to wall using termination bar and elastomeric sealant.

E. Provide and install minimum 4" wide, 24 gauge metal counterflashing inserts (skirt flashing) wherever vertical counterflashing faces at walls, curbs, etc. measures less than 2" in width, or where no counterflashing exists. Fabricate with hemmed drip edge.

F. Curbs, platforms, pipes, etc., shall be a minimum height of at least 8" above the finished roof surface. Extend and/or otherwise alter existing and/ or new curbs, piping, etc. as needed to elevate units to accommodate construction or extension of support cubs or platforms, or to accommodate any other requirements stated herein. Inspect all exposed duct seals and joints and reseal as required. Any moving, lifting or other modification of rooftop equipment shall require supervision by a licensed HVAC technician. Contractor shall be responsible to return any such equipment to its original
operating condition, including proper connection of conduit and condensate lines and recharging of A/C units upon repositioning.

G. Contractor to provide all disconnects and reconnects. All mechanical and electrical work to be performed by licensed contractor. Mechanical and electrical work shall not be performed by roofing contractor personnel unless licensed and verified.

H. Where support platforms occur, extend if needed to a minimum height of 8” above the finished roof surface is required. Reposition if needed to accommodate water flow. Provide flashing components.

I. Any brackets/supports on platforms/sleepers to be set over solid, flat neoprene. Screws or lags to have steel/neoprene washers.

J. Coordinate with Owner’s Representative for location of all equipment, supports, penetrations, electrical panels, pipelines, etc.

K. Primary roof drains shall be lowered into recessed sumps with gradual taper to roof drains provided by the use of tapered insulation. Create sump of minimum 30”x30”, (30”x60” when including overflow) using the insulation thickness.

L. Use only cast iron drain components. After complete installation of the roofing system, all roof drains should be inspected and tested to assure that no clogging of the drainage system is present. The roof drain leader should be in such condition that the full diameter of the drain leader is clear.

M. Walkway protection pads shall be installed in front of roof access points, around, and between mechanical units. Protection pads shall be spaced approximately one to two inches to allow for water flow. Secure walk pad to membrane in accordance with manufacturer’s instructions.

N. Support all pipelines running along the roof surface, as well as duct legs and any non-penetrating supports, using new construction treated wood sleepers adhered over protection material. The protection material shall extend at least 4” beyond the sleeper on all sides. Secure pipes to sleepers using galvanized metal clips secured on both sides of pipe. If required, sleepers shall be stacked and secured together to accommodate elevated pipes. Sleeper supports shall be spaced no more than six feet (6’) apart and installed so as not to impede water flow.

O. Crickets must be installed at any curb over 24” wide
   1. The size of the cricket is determined as show.
   2. The slope of the cricket shall be twice the slope of the main roof area.

P. Edge metal shall be PVC clad metal.

3.08 CLEAN UP

SINGLE PLY ROOFING 07531 - 13
A. Contractor shall remove any markings resulting from the work, from finished surfaces. He is to keep the roof and premises clean and free from accumulations of waste materials and rubbish at all times. He shall remove all debris, scrap, and rubbish from the work area daily. Surplus materials and all equipment shall be promptly removed from the site upon completion of the work. Prior to final acceptance, the Contractor shall restore all areas affected by his work to their original state of cleanliness and repair all damage done to the premises, by his workmen and equipment.

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:
   1. Sheet Metal Coping, Extensions and Cover Plates.
   2. Sheet Metal Counterflashing.
   3. Sheet Metal Sleeper and Platform Covers.
   4. PVC Clad Metal

B. Related Work Specified Elsewhere:
   1. Section 02075 – Removal of Asbestos Containing Roof Materials
   2. Section 06100 - Rough Carpentry
   3. Section 07221 – Roof Insulation
   4. Section 07531 – Single Ply Roofing
   5. All Division 1 Specifications and Contract General Conditions apply to the work of this section as fully as though repeated herein.

C. All Manufacturer's requirements including, but not necessarily limited to, pertinent portions of their specifications and general requirements and recommendations apply to the work of this section as fully as though repeated herein.

1.02 QUALITY CONTROL

A. Refer to Division 1, Section 01400 - Quality Control - for general requirements pertaining to quality control.

B. Applicator shall be company specializing in general sheet metal work with at least five (5) years experience.

C. All sheet metal and HVAC work shall be performed by a qualified, State-licensed contractor for heating, air conditioning, ventilating, and sheet metal. No contractor shall reserve the right to perform any work for which they are not licensed or qualified, and do not perform regularly.

D. Contractor's personnel or subcontractor who will be performing metal work shall attend the Pre-Job Conference.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM) A525 - Steel Sheet, Zinc Coated
ROOF RELATED METAL WORK

(Roofed) by the Hot-Dip Process.


C. Factory Mutual - Loss Prevention Data Sheet 1-49.

1.04 PRODUCT HANDLING

A. Store products under applicable provisions of Section 07531.

B. Stack preformed material to prevent twisting, bending, or abrasion, and to provide ventilation.

C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.05 PROTECTION

A. Exercise care when working on or about roof surfaces to avoid damaging or puncturing membrane or flexible flashings.

1.06 GUARANTEE

A. Work of this section shall be covered under Contractor's warranty specified in Section 07531.
PART 2 - PRODUCTS

2.01 SHEET MATERIALS

A. Pre-Finished Steel: All coping shall be 24 gauge sheet steel with pre-coated white enamel or fluoropolymer Kynar finish such as Color-Klad by Vincent Metals or equivalent product.

B. Galvanized Steel: ASTM A526-80 sheet steel with paint-lock or G-90 galvanized coating. Minimum thickness to be 24 gauge unless otherwise specified or detailed.

C. Clad Metal: Clad metal shall be compatible for welding to PVC roof membrane and shall be min. 24 ga.

2.02 ACCESSORIES

A. Fasteners:
   1. Metal to wood (unexposed): 3/8" head roofing nails, 11-gauge ring shank sufficient to penetrate one (1") inch into wood, galvanized.
   2. Metal to wood (exposed): Buildex - 9-8x1-1/2 HWH Trugrip with neoprene washer.
   3. Rivets: ASTM B315, alloy 110, 5052, 5056, or 6061; appropriate temper, unless temper is specified.
   4. Metal to concrete or masonry: Buildex Tapcon or Rawl Zamac Nailin stainless pin, sufficient for 120-pound lineal foot withdrawal resistance.
   5. Sheet metal to sheet metal (exposed): Stainless steel, Buildex Scots head 300 series 1/4-14x3/4" HWH TRAX/1 with neoprene washer.

B. Metal Primer: ASTM D 41 asphalt primer.

C. Sealants:
   2. Elastomeric Sealant: One (1) part urethane sealant complying with Fed Spec TT-S-00230C, Type II, Class A; ASTM C-920, Type S, Class 25, Grade NS, low modulus.

D. Solder and Flux: Solder ASTM B32 Type recommended for materials being used; flux FS O-F-506C, Type I, Form A or B, 50/50 or better.
E. Coping Finish:
   1. Primer: Factory applied.
   3. Color: As selected by Owner.

2.03 FABRICATION
A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
B. Form sections in ten (10') foot lengths, whenever possible. Make allowances for expansion at joints.
C. Hem exposed edges on underside 1/2"; miter and seam corners.
D. Form material with flat lock seam, unless otherwise specified or detailed.
E. Solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.
F. Fabricate corner pieces twelve (12") inches in each direction from a corner, mitered, riveted, soldered, and sealed as one (1) piece.
G. Fabricate vertical faces with bottom edge formed outward 1/4" and hemmed to form drip.
H. Fabricate flanged flashings to allow flanges to extend at least four (4") inches over roofing. Provide full soldered corners.
I. Shop fabricate work to greatest extent possible. Comply with details shown and/or with applicable requirements of SMACNA "Architectural Sheet Metal" and other recognized industry practices.
J. Form work to fit and match substrates and angles.
K. All metal work to be continuous and unbroken.
L. All walls to receive coping shall have slope to inside and be capped with ice and water shield prior to installing coping metal.

2.04 FINISH
A. Except where pre-finished, all new metal flashing shall be cleaned, prepared and painted to match existing. It is required that drip edge "undersides" be painted prior to installation.
B. Cleaning will require a solvent wash and rinsing.
PART 3 - EXECUTION

3.01 GENERAL

A. Verify all finish dimensions in the field prior to fabrication and then expediently fabricate and install.

B. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

C. Verify membrane termination and base flashings are in place, sealed, and secure.

D. Beginning of installation means acceptance of existing conditions.

E. Do not install surface mount counterflashing where sealant and asphalt based materials will contact each other.

3.02 PREPARATION

A. Field measure site conditions prior to fabricating work.

B. Seam and seal all joints.

C. Set flanges in a bed of roof cement over finished roof plies prior to reinforcing and surfacing.

D. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Solder metal and lead joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

3.03 INSTALLATION

A. Any proposed changes to details shall be submitted to Roofing Consultant for approval prior to commencement.

B. Refer to Section 07531 and Roof Details for additional installation requirements.

C. All metal shall be continuous. “Stepping” around wall penetrations is not acceptable.

D. All lapped metal and the receivers for surface mount counterflashing shall be sealed with one-part urethane as specified herein. No sealant shall come in contact with asphalt-based materials.
3.04 CLEAN UP

A. Contractor shall remove bituminous or other markings from finished surfaces. He is to keep the roof and premises clean and free from accumulations of waste materials and rubbish at all times. He shall remove all debris, scrap, and rubbish from the work area daily. Surplus materials and all equipment shall be promptly removed from the site upon completion of the work. Prior to final acceptance, the Contractor shall restore all areas affected by his work to their original state of cleanliness and repair all damage done to the premises, by his workman and equipment.

END OF SECTION
1. Equipment and drain locations are approximate - contractor & responsible to field verify all applicable dimensions, locations, conditions, etc.

- Fire Penetration
- Vent
- Drain
- Security Light
- Skylight
- HVAC on Platform
- Ladder

Legend:

- FIRE PENETRATION
- VENT
- DRAIN
- SECURITY LIGHT
- SKYLIGHT
- HVAC ON PLATFORM
- LADDER