

WISCONSIN HOUSING AND ECONOMIC DEVELOPMENT AUTHORITY

EPDM - SINGLE PLY MEMBRANE ROOFING REPLACEMENT SPECIFICATION

Section 07500 - June 97 - Revised

TO: Owners/Project Managers/Contractors

RE: All WHEDA Projects
Repair / Reroofing of Minimal Slope Surfaces

I. INFORMATION TO BE SUBMITTED AS A PART OF THE BID:

- A. To facilitate a prompt review of all bid proposals by the WHEDA Asset Management Portfolio staff, a standard bidding format has been developed to ensure competitive, all inclusive, bids. This format attempts to cover the majority of low slope and level roofing surface conditions.
- B. Each bidder is instructed to fully complete, and submit as his/her proposal, the attached "Single Ply Membrane Roofing Bid Form." Failure to provide all information required by the bid form will, at the sole discretion of the Owner and WHEDA, be cause for rejection of the bid.
- C. All bids shall conform to these specifications. Each bidder shall list on the bid form, the type of roofing system being replaced, square feet of membrane to be installed, the estimated number of deck replacement sheets, etc. required by and included in the bid. List name of single ply membrane manufacturer, as well as the membrane weight and method of attachment.
- D. Bidding procedure questions are to be directed to the project representative. Bidders requiring further clarification or having questions regarding these specifications are encouraged to contact: Carl J. Mastaglio, WHEDA Staff Architect at 608 / 267-5270 or FAX: 608 / 267-2825.

II. GENERAL REQUIREMENTS:

- A. The Owner shall obtain the services of an architect or structural engineer to determine the adequacy of the structure to carry the added loading of the roofing system where a loose-laid stone ballasted membrane is proposed to replace an existing BUR roofing system. The contractor shall not proceed until receipt of the structural adequacy determination report.
- B. Contractor shall purchase and maintain liability insurance to protect from claims under work's or workmen's compensation acts and other employee benefits acts, claims for damages because of bodily injury, including death, and for claims for damages to property which may arise out of results from the contractor's operation or any subcontractor or anyone directly or indirectly employed by any of them. Minimum limits shall be as are acceptable to the Owner. Certificates of such insurance shall be filed with the Owner prior to commencing the roof work.
- C. Contractor shall pay unemployment and social security taxes or other taxes imposed by local, state, or federal government and certify to Owner that this has been done before payment is made to contractor.
- D. Contractor shall comply with all applicable state, federal and local codes, and pay all permits, licenses and certificates, and other fees as required by the work.

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- E. Contractor is advised that the building(s) is occupied, and the contractor is cautioned to make every effort to protect and maintain it in a weathertight manner while executing the roofing work. The contractor will be held liable for any damage caused to the building, its contents, and/or injury to its occupants, project grounds or landscape resulting from the execution of the work and/or from not exercising proper precautionary protective measures. Any cost of repair or replacement resulting from damages shall be at the contractor's expense.
- F. Contractor shall furnish all labor and all materials as specified herein and/or required to complete the work. All materials shall be new unless otherwise noted. All labor shall be performed by persons qualified with at least 5 years of experience in the trade.
- G. Contractor shall submit to Owner all specified certificates of warranty and guarantee as a part of the final request for payment. All materials and workmanship shall be guaranteed to be free from defect for not less than two (2) years following the Owner's acceptance of the completed installation, unless otherwise specified for a longer period within the terms of the material manufacturer's warranty for said specified material.
- H. Contractor may submit requests for partial payment (but not more often than on a monthly basis) to the owner for the cost of completed work only. An amount equal to ten (10) percent of the payment request will be retained by the Owner until the contract has been fully completed and warranty/guarantee certificates received by, and the installation accepted by the Owner, and the Wisconsin Housing and Economic Development Authority (WHEDA).
- I. The contract may be changed only by written authorization, approved by Owner and WHEDA. Contractor shall submit any written Change Order to Owner and WHEDA, for approvals, before commencing that work.
- J. Contractor shall prepare and submit to the Owner, for approval, a schedule fixing dates for the work to begin and end.
- K. At WHEDA's option, a representative may review the work upon completion. Contractor shall notify WHEDA at least five (5) working days prior to the anticipated date of completion for possible review.

III. SCOPE OF WORK:

- A. Replacement of **Existing BUR** or Other Modified Bitumen or PVC Single Ply Roofing System:
 - 1. Remove the entire existing roofing system(s) down to the plywood substrate or concrete roof deck surface. Repair deteriorated ineffective deck materials as necessary;
 - 2. Apply one layer of gypsum board 15 minute thermal barrier where code requires;
 - 3. Apply one layer of uniform thickness thermal insulation, two layers at non-nailable decks;
 - 4. Apply tapered insulation to ensure positive drainage over 100% of roof surface;
 - 5. Apply a separation sheet (where insulation board requires) before applying the single ply EPDM membrane complete with all incidentals so as to provide a warranted weatherproof roofing system; and,

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6. Uniformly spread the specified stone ballast provided the structure analysis determined that the existing roof framing system, or after making framing modifications, is adequate.

B. Total Tear-off of Existing EPDM System verses Membrane Tear-off

1. Where existing failed EPDM system, is estimated to involve water entry to more than 40% of the roof area, the contractor is to bid replacement roofing based upon the scope of work under subparagraph A. above; i.e., existing BUR roofing system. Bid work for total removal of the existing roofing system and note on Bid Form the type as "**Total Tear-off**".
2. Where existing EPDM system failure is localized; i.e., within small roof areas, or around roof penetrations or flashing, and is estimated to be less than 40% of the roof area, the contractor is to bid roof replacement based upon the scope of work under subparagraph C. below--Existing EPDM. Note on Bid Form the type of replacement "**Partial Tear-off**".
3. Bid to include an estimate of rigid insulation to replace existing deficient insulation when bidding a "Partial Tear-off". Insulation required beyond that indicated may be invoiced the Owner based upon the Unit Prices listed on the Bid Form.

C. Replacement of Existing EPDM Single Ply Membrane Roofing System:

1. Remove all existing failed EPDM membrane roofing, including the separator sheet and/or recovery board;
2. Expose insulation and inspect for signs of deterioration, water saturation and unsecured panels. Remove and replace all deficient insulation board and mechanically refasten all existing loose insulation, and miscellaneous roof penetrations and accessories;
3. Apply as required tapered insulation to ensure positive drainage over 100% of roof surface;
4. Apply a separation sheet (where insulation board requires) before applying the single ply EPDM membrane complete with all incidentals so as to provide a warranted weatherproof roofing system; and
5. Uniformly spread the specified stone ballast provided the structure analysis determined that the existing roof framing system, or after making framing modifications, is adequate.

IV. GENERAL:

- A. The installation of the roofing system shall be in accordance with this specification and the membrane roofing system manufacturer's published instructions. Should the requirements of this specification conflict with those of the membrane roofing system manufacturer, the contractor shall follow those of the membrane roofing system manufacturer to ensure the availability of the required warranty coverage. However, where the membrane roofing system manufacturer's printed instructions offer options (e.g., the permitted membrane termination methods), the contractor shall follow the requirements of this specification.

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- B. The contract shall include all labor, materials and incidentals necessary to complete the work in a neat and acceptable manner--weathertight in every respect--including, but not limited to, the following:
1. Removal and disposal of the existing roof gravel, roofing and flashing membranes and all defective roofing incidentals;
 2. Removal and disposal of all leaded roof jacks, damaged or non-functional flashings, coping, termination bars, blocking and other roof accessories;
 3. Replacement of deteriorated wood blocking, curbs and cants with pressure treated lumber;
 4. Resetting of roof drains, over-flow scuppers, flashings at walls, and roof penetrations;
 5. Installation of specified insulation boards of uniform thickness, and tapered as required to ensure positive drainage of the roof surface, including mechanical fasteners, adhesives and sealants;
 6. Installation of complete weatherproof ethylene propylene diene monomer (EPDM) roofing membrane system, including all required flashings, and stone ballast covering. The roofing system is to cover all previously covered BUR surfaces, in their entirety; and,
 7. Furnishing of the EPDM membrane manufacturer's Ten (10) Year Roofing System Warranty in conjunction with manufacturer's Ten (10) Year Materials Warranty and roofing contractor's Two (2) Year Workmanship Warranty.
- C. Other specific work and items as described herewith and required for the proper execution of the roofing work shall be considered included in the contract.
- D. Roofing system materials and installation shall conform to the following:
1. These specifications, EPDM membrane manufacturer's currently published instructions and recommendations, and the NRCA (National Roofing Contractors Association) Standards.
 2. Re-roofing materials and application procedures shall comply with all applicable state and local codes; applicable U.L. and/or Factory Mutual fire performance and wind up lift ratings, assembly and/or classification as specified herein:
 - a. Class A assembly as tested and listed in the current U.L. (Underwriter Laboratories, Inc.) Building Material Directory.
 - b. Roof coverings shall carry a Class 1 Fire and I-60 Windstorm Rating as tested and listed in the current FM (Factory Mutual Research) Approval Guide Manual.
 - c. Fire Performance Characteristics of Roofing System:
 - Surface Burning: ASTM E-84;
 - Fire Resistance: ASTM E-119; and
 - Combustibility: ASTM E-136.

V. MATERIALS:

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A. COMPATIBILITY OF MATERIALS

1. Roofing contractor and material suppliers for the roofing system to be installed shall be held responsible for ensuring that all materials including fasteners and adhesives are fully compatible to the conditions, adjoining materials and their intended usage's for the satisfactory performance of the finished roofing system.

B. ROOF DECK

1. Replacement panels shall be Structural 1, C-D Interior APA plywood with exterior glue of thickness to match existing. Partial replacement panels shall span over a **minimum** of 3 rafters or truss chords.
2. The substitution of OSB or other wafer type sheathing is prohibited, except where the existing deck is already an OSB type sheathing.

C. SINGLE PLY ROOFING MEMBRANE

1. Non-traffic-bearing type flexible sheet membrane, intended for weather exposure as primary roofing, Loose Laid Single Ply EPDM Membrane Roofing System-- as manufactured by one of the following:

- Carlisle SynTec;
- Celotex Corporation;
- Firestone Building Products Co.;
- Versico Incorporated (formerly Goodyear Tire & Rubber Co.);
- Weathergard Roofing Systems Inc.

2. EPDM Membrane shall comply with the following minimum standards:

- Tensile Strength (ASTM D0412): 1400 psi;
- Ultimate Elongation (ASTM D-412): 350%;
- Brittleness Temperature (ASTM D-746): -75 deg. F (-59 deg.C);
- Tear Resistance (ASTM D-624): 175 lbs. per lineal inch;
- Resistance to Ozone Aging (ASTM D-1149): No cracks after 168 hours exposure of 50% elongated samples at 104 deg. F and 100 pphm ozone;
- Resistance to Heat Aging (ASTM D-573): Maximum reduction in elongation of 35%, maximum loss of tensile strength of 10% after 4 weeks of 240 deg. F.;
- Water Reabsorption (ASTM D-471): +2.0% Volume Change after 168 hrs @ 158 deg. F.;
- Oil Resistance (ASTM D-471): 115% Vol. Change-ASTM Oil #3.

3. Membrane Characteristics:

- Primary roofing membrane: 45 MILS, nominal;
- Flashing membrane: 60 MILS, nominal; and
- Exposed face color: Manufacturer's standard (dark grey).

4. Sheet Seam System: Manufacturer's standard materials for sealing lapping joints--such as primer (cleaning solvents) and adhesives.

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D. WHERE CODE REQUIRED - 15 MINUTE THERMAL BARRIER

1. One-half inch (1/2") gypsum board, all joints tightly butted, to be placed directly over the wood deck prior to the installation of the rigid insulation.

E. ROOF INSULATION

1. Roof insulation shall be closed cell, rigid plastic foam extruded polystyrene foam--products as manufactured by the Dow Chemical Company "Styrofoam", U.C. Industries, Inc. "Foamular", or Carlisle Corporation "Sure-Seal
2. The insulation board shall have the following characteristics:
 - Standard widths and lengths, SM or TG edge;
 - Thickness-1-1/2" minimum;
 - 5 year aged "R" value of 5.4 at 40 deg F, 5.0 at 75 deg. F per inch;
 - K factor 0.22;-ASTM C578 for type indicated; and
 - Type IV 1.5 lb/cu. ft. minimum density.
3. Tapered roof insulation, factory prepared units with a continuous finished surface cut of not less than 3/16" per foot with a minimum edge thickness of 1/4 inch--placement to promote positive drainage of roof's surface.

F. MECHANICAL FASTENERS **[USE ONLY IF REQUIRED BY PARA. IV.D.2.b.]**

1. Provide Elco Tapdek-SP fastener with thermoplastic disc and self seating, self taping screws compatible for secureance of the insulation to existing deck material and approved by the insulation and membrane roofing manufacturers, and FM to achieve specified hold down classification.
2. Furnish and install all other battens, plates, accessory components, fastening devices, adhesives and sealants necessary to properly execute the re-roofing work as specified, and/or as recommended by the membrane manufacturer and required to meet UL and FM roof system ratings.

G. WOOD BLOCKING

1. Wood blocking, nailer, curbs and cants of every dimension for their intended uses. Wood members shall be pressure-treated with salt preservatives--(No creosote or asphalt preservative treated members are permitted).
2. Adequately anchor all wood members with nails bolts or other fasteners as required to make secure. Provide for differential movement in roof with intersecting vertical wall construction and roof penetrations.

H. AGGREGATE SURFACE BALLAST

1. Provide roof ballast of washed, rounded, riverbed gravel or other smooth-faced stone that is proven to withstand weather exposure without significant deterioration, and is acceptable

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for the fire ratings specified herein. Stone shall range in size from 3/4" to 1-1/2" in diameter. Distribute ballast stone uniformly upon the roof membrane at the material rates (lbs./sq.ft.) specified herein.

VI. EXECUTION OF WORK

A. REMOVAL OF EXISTING ROOFING

1. Remove existing roof membrane down to the roof's existing plywood deck substrate or rigid insulation in the case of a partial tear-off to replace an existing EDPM roof. NOTE: **Do not** remove any more of existing roofing than can be adequately protected and made weather-tight by the end of each day's work.
2. Inspect present plywood decking or rigid insulation; remove all wet or deteriorated sections. Let roof deck area ventilate to remove latent moisture. After removal of insulation and/or decking, in-fill areas with like material to adjacent levels and secure in place. Partial replacement panels shall span over a **minimum** of 3 rafters or truss chords. Resecure all existing roof deck and rigid insulation that is found to be loose.
3. Should an existing vapor barrier be encountered, having tears and/or punctures, reseal with tape or adhesive.
4. Remove existing vertical composition base flashing at curbs, roof penetrations and parapet walls. Remove and replace all rotted wood blocking, curbs and cants with treated lumber. Remove all lead flashing from existing soil stacks and provide premolded pipe seals compatible with EPDM membrane, in accordance with manufacturer's recommendations.
5. Remove all debris from roof and dispose of off the project site. Broom clean insulation substrate before proceeding.

B. COLD WEATHER APPLICATIONS

1. Roofing contractor shall take precautions to ensure satisfactory performance of the finished roof when temperatures fall below 45 deg F. Ensure that deck surface, existing insulation and blocking are dry and free from all traces of ice, snow and moisture before applying additional insulation and/or membrane roofing and flashings.
2. Contractor will be held responsible for the repair of all deficiencies in the system found within the warranty period at no cost to the owner when such deficiencies are the result of moisture in the substate materials.

C. INSTALLATION OF INSULATION

1. First layer; following the installation of the code required gypsum board thermal barrier, over the entire deck, 1-1/2" insulation board shall be applied to existing roof's substrate that is completely dry--free of moisture. First layer shall be laid with long dimension running perpendicular to roof's slope. Long joints of board shall be laid in a continuous straight line with end joints staggered.

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2. Second layer; over the entire deck, lay tapered insulation, having a 3/16" per foot minimum taper, in a manner to assure positive drainage of surface water to existing roof drains and/or scuppers. Stagger 1/4" max. width joints with those in layer below. Hold perimeter of roof at a constant thickness providing a uniform roof deck elevation at all parapet and vertical walls. Roof crickets shall be incorporated into roof slope for proper drainage to sump roof drains or scuppers.
3. **[USE ONLY IF REQUIRED BY PARA. IV.D.2.b.]** Secure board(s) to the existing roof deck using Elco's Tapdek-SP fasteners, with thermoplastic or metal disc, or other approved fasteners. Install the number of fasteners per board necessary to meet the fire and wind uplift requirements specified herein. Along first four (4) feet of roof's perimeter, a minimum of 6 fasteners shall be installed. In no case shall there be less than one (1) fastener for every 3 square feet of insulation board installed.
4. Where roof drains exist, reset and install 24" min. width of tapered insulation around drains so as to ensure a uniform slope for proper drainage. High spots around slump roof drains, will not be allowed. Correct all deficiencies in roof's slope before applying EPDM membrane roofing.
5. Where scuppers exist, extend tapered insulation to outside surface to promote drainage and prevent pocketing of water. Correct all deficiencies in roof's slope before applying EPDM membrane roofing.

D. EPDM MEMBRANE ROOFING

1. Broom clean roof's substrate of all debris. Verify securement of insulation and uniformity of roof slope before proceeding.
2. Prior to the installation of EPDM membrane, apply a slip sheet or separator sheet to final substrate if recommended by membrane manufacturer.
3. Roll out EPDM membrane sheets onto roof surface allowing it to relax. Joints and laps, field and factory made, shall not occur in low points or valleys of roof's surface. Secure membrane at perimeters and roof penetrations, using approved roofing nails or anchor bars. Align sheets to previously laid sheet providing a 3" minimum overlap.
4. All membrane laps are to be sealed together and fabricated to shed water. Fold top sheet back onto itself and clean underside and upperside of the bottom sheet with solvent recommended by manufacturer to remove dirt and talc from the lap area. Allow solvent to flash-off before applying adhesive. Apply adhesive evenly to both surfaces and allow to set in accordance with manufacturer's application instructions. Roll top sheet over the bottom sheet in a manner that minimizes voids and wrinkles. Apply pressure to lap with seam roller tool to ensure continuous contact.
5. Fully adhere EPDM roofing into scupper ways and up side walls. Terminate ballast at metal stop 6" before scupper opening.
6. Inspect lap edges and repair all unsealed area, voids and fishmouths in a manner acceptable to the EPDM manufacturer's representative. All exposed membrane edges shall be finished with a sealant where recommended by manufacturer.

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7. Aggregate surface ballast shall be distributed over EPDM roof membrane at the rate of 10 lbs. per square foot increasing gradually to 12-13 lbs. per square foot along the first 4 feet of the roof's perimeter. Provide a ballast stop at all open scuppers.

E. FLASHINGS

1. Prime those areas of vertical walls to receive flashings. Extend the roof's full MIL thickness EPDM roofing membrane up the vertical face, apply with adhesive and secure to wall with fastening strips anchored at 12" o.c. Apply a fully adhered 60 MIL cured elastomeric membrane flashing strip, of sufficient width to extend 6" onto roof and 8" + up wall, to underside of metal flashings and/or metal termination bar.
2. Where a termination bar is necessary and recommended by the manufacturer's warranty for the membrane, provide same fastening to wall with anchors at 6" o.c. Apply a bead of water cut-off mastic or tape strip to the wall in line with the placement of the flashing strips and termination bars. Caulk top joint of termination bar to wall face with the elastomeric sealant recommended by membrane mfr., to make a weather-tight seal.
3. Flash roof penetrations, corners, areas where the membrane must be formed or must change direction with 60 MIL uncured elastomeric membrane flash materials. Fully adhere all membrane flashing to substrate for weather-tight installation in accordance with manufacturer's recommendations. Porous masonry substrates shall be waterproofed and primed prior to application of all membrane flashings and accessories.
4. All membrane flashings shall be applied fully secured to the substrate surfaces with an approved adhesive. Allow adhesive to properly set, according to manufacturer's application instructions, before placement. Roll membrane into adhesive in a manner that minimizes voids, wrinkles and fishmouthing. Inspect all seams and repair all unsealed areas.
5. Seal flashing laps, and joints where flashings meet the roof membrane, with adhesive in a manner similar to that used for membrane laps. Apply pressure to ensure a complete continuous weather-tight seal.
6. Install premolded EPDM pipe flashing over all pipe penetrating roof. Adhere to roof membrane and caulk around the pipe per manufacturer's recommendations.

VII. FINAL REQUIREMENTS

- A. Protect all surfaces against damage. Upon completion, clean all adjacent surfaces soiled by the roofing work.
- B. These are occupied buildings--exercise extreme care. Provide all barricades necessary to protect the residents during the construction activities.
- C. At the end of each working day, remove all portable tools, etc., which may constitute a potential hazard to the tenants, or an attractive nuisance. Upon completion of the work, remove all remaining debris, barricades, tools, and equipment from the site.

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- D. Make all repairs to landscaping and building improvements damaged in the performance of the reroofing work, including but not limited to: repairs or replacement of sod, trees, concrete, paving, building surfaces, incidentals or equipment attached to or detached from project. Use of plywood sheets and wood planking to prevent rutting of lawn is highly recommended.
- E. Base bid is to include the contractor's performance of an inspection of the roofing system, the issuance of a written report of his/her findings, and related recommendations, 18 months following the Owner's acceptance of the completed installation.

End of Specification

EPDM - SINGLE PLY MEMBRANE ROOFING BID FORM

(In accordance with WHEDA's Standard Single Ply Membrane Roofing Specification
Section 07500 -- EPDM \ 06.97)

This form must be fully completed and attached to all roofing proposals submitted for WHEDA-financed projects, even though the information required herewith may be a part of the contractor's standard bid form. At the discretion of WHEDA and the Owner, failure to complete bid form may be sole cause for rejection.

Project Name: _____ WHEDA No. _____

Project Address: _____

Project Owner/Contact: _____

Contractor's Name: _____ Tel.No.: () _____

Contractor's Address: _____ Zip: _____

[Complete all required base bid information below; if none, write "NONE."]

- Existing type of roofing system being replaced: _____;
- Single ply membrane replacement manufacturer: _____;

_____ ; _____ ; _____
 Type Weight Method of application

- Is total removal of existing roofing down to plywood deck substrate included in the base bid? Yes _____ No _____; OR to existing rigid insulation? Yes _____ No _____.
- Does the structural analysis of the building furnished by the Owner permit application of stone ballast? Yes _____ No _____. Is stone ballast included in the base bid? Yes _____ No _____.
- The following estimated quantities are included in the base bid:
 - 1) Total area of existing roof(s) in project: _____ Sq.Ft.
 - 2) Total area of roofing to be replaced: _____ Sq.Ft.
 - 3) Total area of 1-1/2" EXTRUDED POLYSTYRENE insulation to be installed: _____ Sq.Ft.
 - 4) Total area of tapered EXTRUDED POLYSTYRENE insulation to be installed: _____ Sq.Ft.
 - 5) Number of sheathing panels (4'x 8') to be replaced: _____ Panels
 - 6) Prefinished metal parapet coping to be replaced: _____ Lin.Ft.
 - 7) Termination bar to be installed: _____ Lin.Ft. NO EXPOSED RAW EDGE ALLOWED.

Total contract price includes the contractor's 2-year mechanics warranty for all work, plus both the EPDM manufacturer's 10-year labor and materials warranty and 10-year total system warranty. **Final payment is contingent upon the owner's receipt of all three fully executed warranties.**

TOTAL BASE BID: \$ _____ ALTERNATE ADD: \$ _____

Contractor's Signature

Date

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(SEE OPPOSITE SIDE FOR REQUIRED UNIT PRICES AND REFERENCES.)

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UNIT PRICES [Listing Mandatory] for work not included in the base bid:

- o Removal and replacement of wood roof sheathing: \$_____/Sq.Ft.
(Minimum replacement section for plywood, 4'x 4' where trusses @ 24"o.c.
and 4'x 2'-8" where rafters @ 16" o.c.)

- o Removal and replacement of deteriorated rigid insulation: \$ ____/Sq. Ft.
Type of insulation: _____ Thickness: _____ inch

CONTRACTOR'S ALTERNATES - OPTIONAL

- o Contractor may at their option provide an alternate to that specified or additional work necessary to provide a completely watertight, warranted roofing installation. The Full Scope of the Alternate(s) is to be attached to Bid Form and shown on bid where provided--(if the alternates result in a deduct to the "Base Bid" show same as a negative number) to that which deviates from that specified, which the Owner may consider

REFERENCES LISTING:

List three references for work completed at least eighteen (18) months to five (5) years prior to date for this bid for owner's review. Failure to provide the following information will be sole cause for rejection of bid.

Project Name:_____ Location:_____

Contact Person: _____ Tel. No. (____)_____

Project Name:_____ Location:_____

Contact Person: _____ Tel. No. (____)_____

Project Name:_____ Location:_____

Contact Person: _____ Tel. No. (____)_____