

# Quality Assurance, A to Z

By Nick A. Lovato

The following is an extract of a presentation given by Nick Lovato at a mini BURSI co-sponsored by RCI Region V and the Denver Chapter of the Construction Specifications Institute (CSI) Dec. 12, 1996 at the Schuller Mountain Technical Center near Denver.

## Essentials for Quality

*Quality does not happen by chance; it is always the result of high intentions, thoughtful direction, precise communication, dedicated teamwork, and skillful performance. It embodies the wise choice of many options.*

First, the owner must be willing to provide an adequate budget to purchase the proper materials and accomplish the work necessary to obtain a quality roof system.

A good design, with sufficient details, allows the bidders to include in their cost proposals the work needed to install the roof system properly and address all of the job conditions correctly. Details for closures, transitions and flashings are often overlooked. Areas that often become problematic are:

- Pitch pans without hoods.
- Equipment sleepers that damage the roof or dam water.
- Scupper and drain details.
- Parapet wall flashings that rely on caulking.
- Gravel stop flashing.
- Gutters with inadequate expansion joints.
- Rooftop piping that is not allowed to move independently from the roof membrane.

Skillful management and application must be employed. The foreman must have a thorough knowledge of the specifications and drawings. The superintendent must provide his crew with all the necessary materials, tools and skilled labor to install the roof system properly. At critical phases of the roof installation, the project manager or consultant should visit the project to assure that the foreman and his laborers understand the proper installation of each detail. Good communication is essential.

Once a quality roof system has been

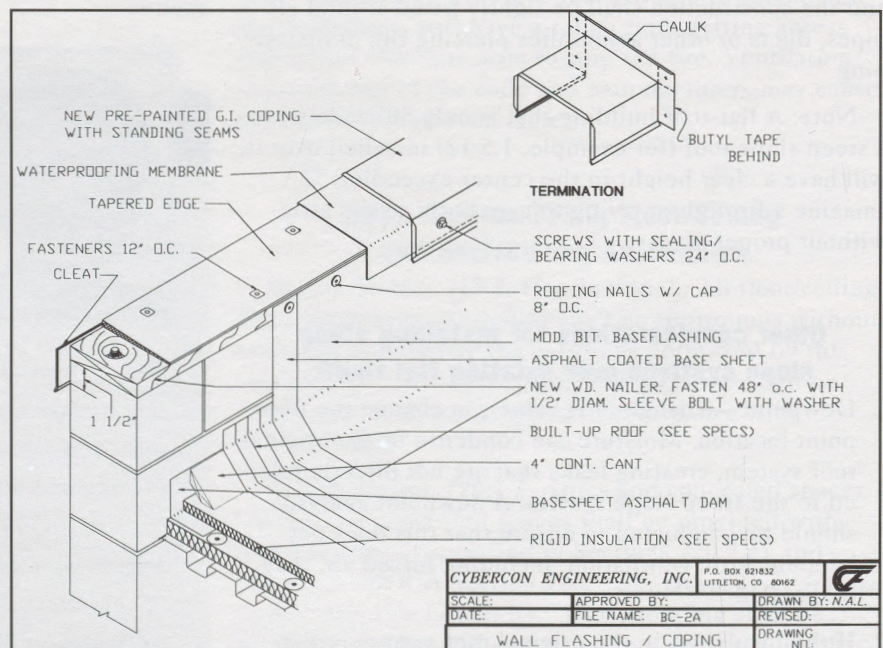
installed, it is up to the owner to provide periodic inspections so that the roof will receive proper care and maintenance.

## Design Development

The design development phase is the best time to install quality. Careful consideration should be given to drainage, insurance and code criteria, building environment, occupancy, sequencing, job conditions and details. The designer should not leave a detail up to the roofing contractor, who is usually bidding the job competitively. Envisioning every aspect of the project from start to finish is an excellent way of identifying potential problems and pitfalls.

## Construction Documents

The specifications and drawings become the recipe for the fabrication of the roof system. At this phase, the designer has the opportunity to select and define quality products, application procedures, establish details for all terminations, penetrations, transitions and closures, handling and storage guidelines, and quality control procedures. Mock-ups can also be specified to assure that the difficult and problematic



*Provide an asphalt dam at building edges to prevent asphalt spills into the building. Slope coping to drain. Standing seams are preferred over lap seams. Encapsulating the top of the wall with membrane provides temporary waterproofing and a back-up waterproofing system below the metal coping. All terminations and transitions should be detailed.*

details are understood and followed. This can be very beneficial on cold storage facilities and for vented roof systems where an effective air barrier is critical.

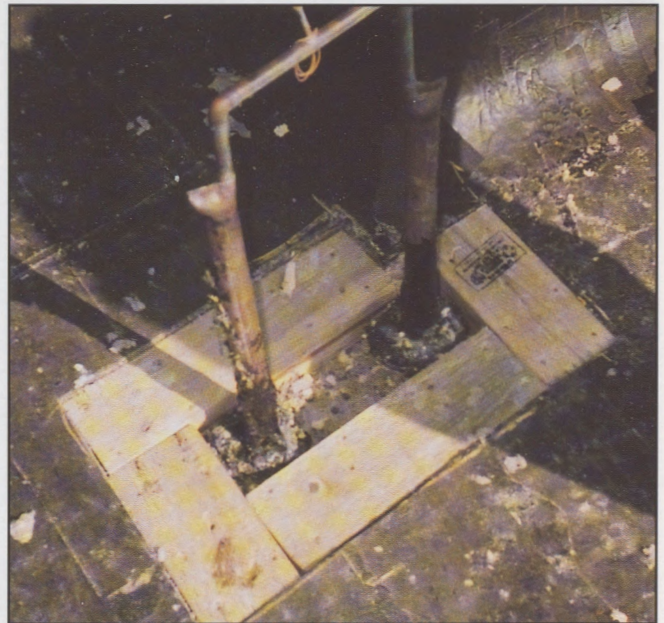
### Bid Proposal

The bid documents can be structured to clarify and facilitate the owner's expectations with regard to quality. On private work, the designer or owner can be selective with his or her bidders. Contractors who invest in the quality of their human resources and training generally are the ones who consistently install quality roofs and are usually the ones solicited to bid on most projects for owners, consultants and A/E firms. On most public work, bidders' qualifications can weed out inexperienced or undesirable contractors. The bid proposal form should contain unit cost items for work that is not quantifiable, i.e. snow removal, deck repair, interior protection, etc. If provisions have been made and a contingency set aside to address these items, the contractor will be more willing to bring substandard job conditions to the attention of the owner's representative, knowing that these are reimbursable expenses. A work schedule submitted with each bid can be very beneficial. It establishes the resources and time frame that the contractor will commit to and helps all concerned parties set goals to accomplish the necessary work.

## Construction Phase

### Pre-bid Conference

A pre-bid conference with all bidders is the first opportunity the designer has to convey the intent of the specifications and the expectations of the owner. This is also an excellent opportunity to elicit the contractors to share their



*Pipe cluster with nailers prior to membrane.*

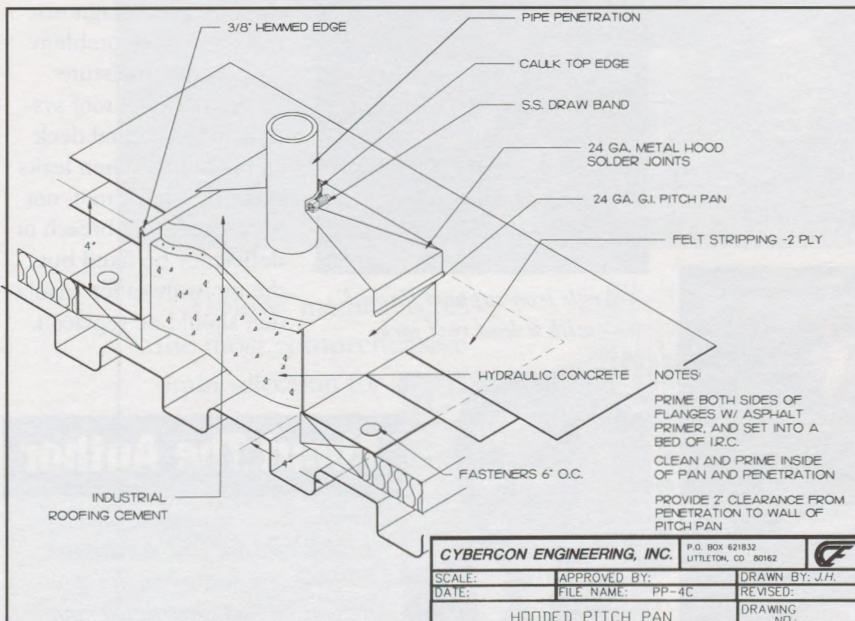
years of experience. A more efficient and effective detail or methodology may be presented. A sense of teamwork can be established at the onset.

### Pre-job Conference

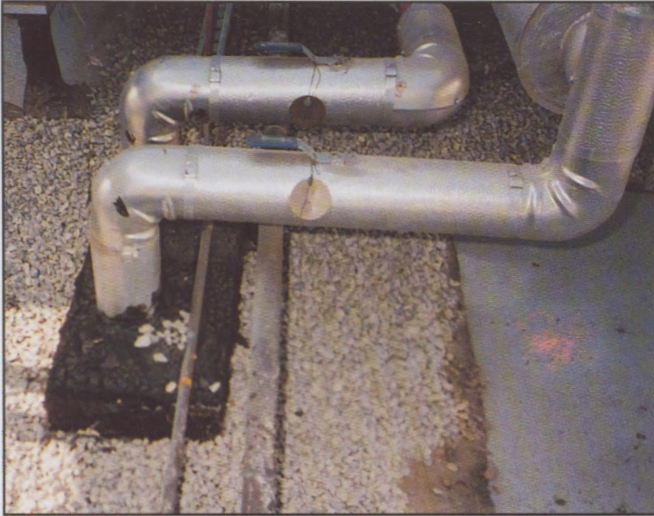
The intent of the specifications should be reiterated. The foremen and superintendents should attend this meeting. Submittals should be carefully reviewed. Do all materials comply with the specifications, codes and insurance requirements? Many times contractors will submit similar products from different manufacturers which may not be tested to meet the UL or FM ratings that have been specified.

### On-site Inspections

Rarely do contractors include in their bids the cost to have a job superintendent or project manager on site full-time. Doing so would increase their overhead and make them less competitive. Roofing consultants have filled this void with full-time application observers. An effective inspector is a teacher rather than a policeman. If the owner elects not to have a full-time inspector, it is important that the consultant or designer schedule inspections at critical times, such as the start of the job, when edge details are being installed, penetrations are being flashed and when sheet metal work commences. Proper scheduling requires constant communication with the project superintendent or project manager. The weather should be constantly monitored. Prior to inclement weather, the production should be slowed down so that the roof can be left in a watertight condition each day with-



*Hooded Pitch Pan: Open pitch pans often fail due to lack of maintenance. Mastic shrinks, allowing water to collect inside. Water becomes trapped and corrodes the metal flashing from the inside out. Provide nailers to secure deck flange. Solder all joints to prevent migration of sealer. Surfaces should be primed. Installation of a hood will act as a first defense against leaks and protect the mastic inside from UV degradation.*



*Insulated lines flashed with a pitch pan prior to hood.*

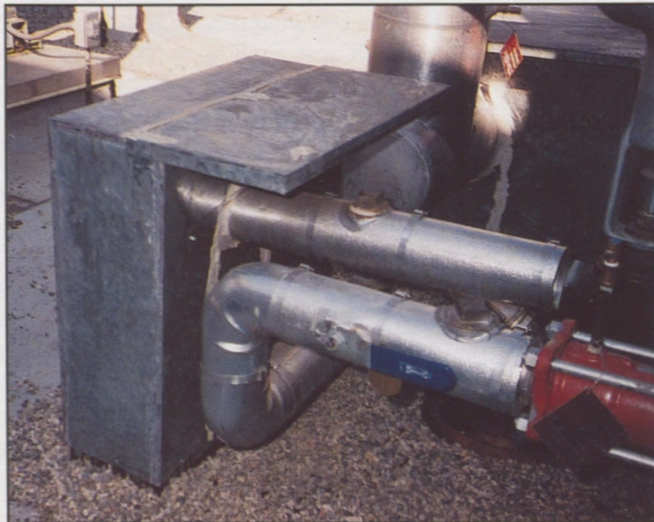
out phasing. If corrective action is needed by the contractor, proper documentation will facilitate timely and proper completion of deficient items. Identifying the areas on a roof plan with key notes and photographs seems to be the most effective way of communicating the desired results and is well worth the effort.

#### Final Inspection

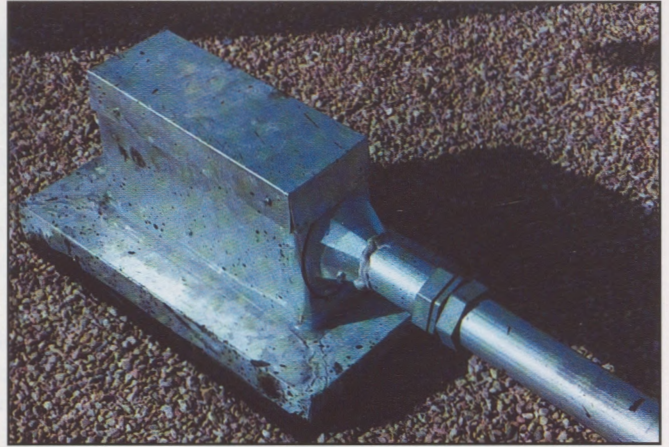
Each project should include a pre-final and one or more close-out inspections with the foreman, superintendent or project manager and owner's representative in attendance. Deficient items should be marked on the roof as well as identified on a roof plan. Again, photographs help identify the problem areas. Referencing the specifications and drawings can also be beneficial in avoiding further unnecessary communications.

#### Post Application

Efforts to achieve quality should not end with the completion of the roof. The owner should be made aware of future potential problems and items that should be monitored—grease contamination, clogged drains and other



*Another example of a hooded pitch pan.*



*Completed flashing of hooded pitch pan.*

maintenance guidelines. A sign at the access hatch which provides a phone number and rules for accessing or installing equipment on the roof can be beneficial. Procedures and guidelines for performing tenant improvements will be greatly appreciated by most owners. Most roofs are replaced prematurely due to neglect, abuse and from being misdiagnosed. A good maintenance and inspection program by a quali-



*Angle iron support flashed with a lead roof jack.*

fied consultant can greatly benefit the serviceable life of the roof and save the owner thousands of dollars. On some roofs, a periodic non-destructive moisture evaluation—infrared, nuclear, or capacitance—can be a good diagnostic tool to identify problem areas before moisture deteriorates the roof system and structural deck components. When leaks occur through a roof, not only should the breach or deficiency be fixed but the moisture-laden insulation should be replaced.



#### About The Author

*Prior to founding CyberCon Engineering Inc., in Englewood, CO, Nick Lovato handled projects for the roof construction management group of an international roofing manufacturer. He is a past director of Region V for RCI, is a member of the American Society of Civil Engineers, of Chi Epsilon (Civil Engineering Honor Society), and a faculty member of RIEI. He has over 20 years of professional experience in roofing.*