

**Statistical Survey and Engineering Analysis of Performance
COMMERCIAL & INDUSTRIAL APPLICATORS, INC.
information compiled by
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In January 1993 Dr. Kashiwagi inspected 51 roofs
Installed by Commercial & Industrial Applicators, Inc. since 1977 in the Houston area .
The roofs were randomly selected from a listing of all roofs installed by CIA.
This report presents the performance of the roofs installed by CIA as determined by the following:

Roof Selection Methodology	Roof Survey Methodology
<ul style="list-style-type: none"> • The Contractor provides a complete listing of all roofs installed by the company since inception. • Roofs are selected, with no knowledge of roof performance prior to the inspection, in a local geographical area to expedite inspection and the collection of the data, and the largest roofs are priority selected. • The accuracy and completeness of the CIA's list of roofs installed was verified, by performing a random check of CIA's files. • A minimum of 50 roofs are inspected. • An in depth Investigation is performed to define the facts should allegations be made about the contractor or the roofs. 	<ul style="list-style-type: none"> • A minimum of 50 roofs are inspected; the condition of the roof membrane, flashing, and the over all performance is annotated, and the physical characteristics of the roofs are recorded, and rated in comparison with established performance criteria. • The facility owner is interviewed regarding the level of their satisfaction with the contractor, the performance of the roof system, and to obtain the history of any leakage, maintenance inspections, and conditions which required repairs to be made to the roof.
Roof System Rating	CIA's Roof Survey Results
<ul style="list-style-type: none"> • A performing roof system requires: An Expert Installer, quality materials, and professional design. • The survey determines roof system performance by value rating the following: first cost, annual cost; performance against leaking; maintenance requirements of system; repair requirements; service period; the ability to withstand roof foot traffic; and the ability to perform in specific and various environments. 	<ul style="list-style-type: none"> • 97% Customer Satisfaction • 51 total roofs were inspected • 15 year proven performance period • 4 roofs inspected were older than 13 years • 53% roofs never had any maintenance performed • 63% roofs have never leaked • 9% had current leaks, however the owners had never notified the contractor. All leaks were easily repaired with sealant, 2 wall leaks, 1 skylight leak) • 15% roofs require more than 1% maintenance • 51% roofs have some ponding water

	<ul style="list-style-type: none"> • 51,261 SF is the average size of roofs inspected
Location of CIA Roofs Inspected: and the various roof membrane systems observed	
<ul style="list-style-type: none"> • Houston, TX: Medical Center, Prairie View A&M, Intercontinental Airport, University of Texas, University of Houston, Hobby Airport • Pasadena, TX • Bellaire, TX • Conroe, TX • Huntsville, TX • Bryan / College Station, TX 	<ul style="list-style-type: none"> • 11 Graveled Covered Urethane membrane roofs • 23 Silicone Coated Urethane membrane roofs • 7 Acrylic Coated Urethane membrane roofs • 8 Urethane Coated Urethane membrane roofs • 2 Butyl / Hypalon Coated Urethane membrane roofs

Economic Analysis CIA System vs. Alternate Systems	Roof Inspection Conclusions:
<ul style="list-style-type: none"> • • A performance period of the Urethane membrane system in Houston is verified to be 20 years. • CIA's roofs installed have a 15- year performance period. • There is no performance data for any other roof system longer than seven years. • If a comparable EPDM system performs for 15 years, then Urethane system installed by CIA need only perform for 10 years to be economically feasible. (assuming an interest rate 10%, an inflation rate of 5% or less) • CONCLUSION: It would be very difficult to find a more economically feasible roof system than a urethane membrane system installed by CIA. 	<ul style="list-style-type: none"> • • CIA is an "excellent" roofing contractor. • CIA has the most economical roof system in the Houston area.