Building Diagnostic Robotics Inspection Report

Building Scanned:
Sample Building

Location:
111 ABC Street, NY, 10001

Test Date:
27th February, 2024 10:07 AM

On Site Engineers:
EngineerA, EngineerB, EngineerC

Contents

1. Executive Summary

The following executive summary provides a brief overview of the moisture damage and visual anomalies detected in the building.
Survey conducted on: 27th February, 2024 10:07 AM
Address: 111 ABC Street, NY, 10001

The following table provides a summary of the moisture damage in each section of the building.

Section Number	Moisture Percent	Risk Level	Square Footage	Area Damaged
1	19.08%	High-Risk	3080 sq.ft.	587 sq.ft.
2	15.72%	High-Risk	9160 sq.ft.	1439 sq.ft.

Total Assessed Area: 12240 sq.ft.
Total Rooftop Area: 18604 sq.ft.

The following table provides a summary of the visual anomalies detected in each section of the building.

Anomaly Type	Section 2
Base Flashing-Coated Metal	21
Base Flashing-Membrane Material	12
Debris And Vegetation	2
Defective Seams	10
Flashed Penetrations	3
Improper Equipment Supports	1
Interior Drains And Roof Level Scuppers	1
Membrane Support Deficiencies	1
Ponding	15
Ridges	9
Splits	1

Recommendations:
Section 1: Retain a specialist roof consultant to monitor roof condition and suggest repairs to lengthen the life of your roof asset. Roof likely has between 5 and 15 years of remaining roof life. Roof life can be extended by an additional 10 to 15 years by reroofing or adding a second roofing layer.
Section 2: Retain a specialist roof consultant to monitor roof condition and suggest repairs to lengthen the life of your roof asset. Roof likely has between 5 and 15 years of remaining roof life. Roof life can be extended by an additional 10 to 15 years by reroofing or adding a second roofing layer.

2. Roofer Analysis Cost Estimation

Our comprehensive roofer analysis identified various defects across the building envelope that require remediation to maintain structural integrity and prevent water infiltration. We've thoroughly evaluated these findings and developed a detailed scope of work to address each identified deficiency. To assist with your capital planning, we have prepared cost estimates for implementing the recommended repairs. These estimates will help you understand the investment required to optimize your building's performance and prevent further deterioration. The following table provides a summary of the costs by section.

Section	Total Cost
Section 2	$138,701.37
Total	**$138,701.37**

Table 2.1: Summary of Costs by Section

Addressing these defects in a timely manner is crucial to prevent water infiltration and avoid more extensive damage to both the building envelope and underlying building components. Deferring these repairs typically leads to accelerated deterioration, which can result in significantly higher repair costs and potential disruption to building operations. By implementing the recommended repairs now, you can protect your building asset while realizing long-term cost savings through reduced emergency repairs and extended building life expectancy.

3. Section - 2

3.1 Section - 2 Overview

Based on our comprehensive inspection and analysis using industry-standard ROOFER methodology, we have assessed the current condition of this roof section and estimated its remaining service life. The following metrics provide a clear picture of the roof's current state and guide our recommendations for maintenance or replacement actions.

Assessment Metrics	**Value**
Current Roof Age	20 years
Expected Roof Life	23 years
Remaining Roof Life	**3 years**
Roof Condition Index (RCI)	50
Visual Condition Rating	**Fair**
MRR Recommendation	Major Repair Needed
Recommended Action	**Replace**

Table 3.1: Roof Condition Assessment Summary for Section 2

Understanding the Assessment: The Roof Condition Index (RCI) is a comprehensive metric that evaluates the overall health of the roof system based on identified defects and their severity. The Visual Condition Rating translates this score into an easy-to-understand category. The Recommended Action and MRR (Maintenance, Repair, and Replacement) Recommendation provide clear guidance on the appropriate course of action to maintain or restore the roof's integrity.

Important: This section has limited remaining service life. We recommend prioritizing repairs or replacement planning to avoid potential failures and water infiltration issues.

This section of the building was inspected and 2303 conditions were identified requiring attention. The observed issues include Improper Equipment Supports, Moisture Damage, Base Flashing Coated Metal. These deficiencies should be addressed as part of the recommended scope of work to maintain the integrity of the building envelope and prevent further deterioration.

Description	Unit	Total Cost
Base Flashing Coated Metal (High)	LF	$7,512.44
Base Flashing Coated Metal (Low)	LF	$5,008.30
Base Flashing Coated Metal (Medium)	LF	$13,772.81
Base Flashing Membrane Material (High)	LF	$5,685.05
Base Flashing Membrane Material (Low)	LF	$3,790.03
Base Flashing Membrane Material (Medium)	LF	$13,265.11
Debris Vegetation (Medium)	SF	$388.88
Defective Seams (Low)	LF	$1,743.63
Flashed Penetration (Low)	LF	$229.56
Flashed Penetration (Medium)	LF	$459.13
Improper Equipment Supports (Low)	SF	$41,814.97
Interior Drains And Roof Level Scuppers (Medium)	LF	$2,549.20
Membrane Support Deficiencies (Low)	SF	$6,266.03
Moisture Damage	SF	$23,886.14
Ponding (Low)	SF	$9,108.00
Ridges (Medium)	LF	$3,186.97
Splits (High)	LF	$35.11
Total Cost		**$138,701.37**

To help you make informed decisions about roof repairs and capital planning, we have prepared a cost-benefit analysis that shows how different repair strategies impact the roof's service life. The chart below illustrates the relationship between repair costs and the additional years of service life you can expect from your roof.

Understanding the Chart: Each point on the line represents a repair scenario, starting from the baseline condition (no repairs) and progressively adding fixes for identified defects. The horizontal axis shows the cumulative cost of repairs, while the vertical axis indicates the additional service life gained in years. This visualization helps you identify the most cost-effective repair strategies for maximizing your roof's lifespan.

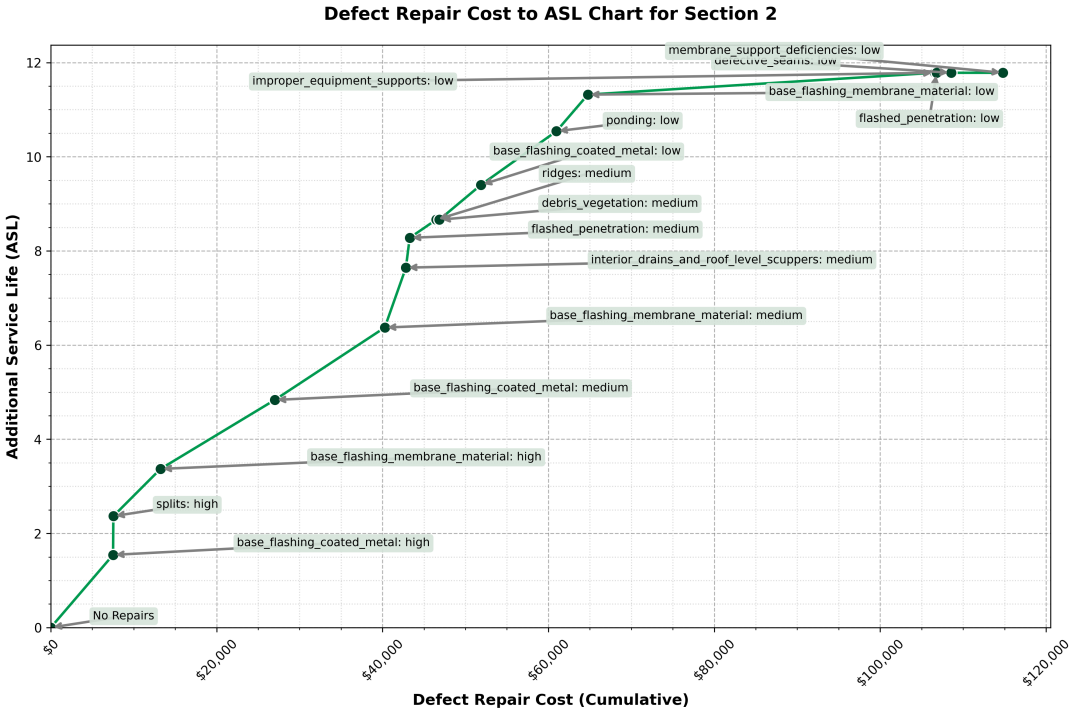

Figure 3.1: Cost to Additional Service Life Analysis for Section 2

3.2 Base Flashing Coated Metal (High Severity)

During the inspection, 60 instance(s) of base flashing coated metal (high severity) were identified, requiring remediation across 60 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Remove existing single-ply base flashing and coated metal at defect location, including deteriorated sealant and fasteners	SF	$1.10	$5.20	60	$378.00
Repair or replace any deteriorated substrate beneath flashing to ensure sound base for new installation	SF	$1.10	$5.20	60	$378.00
Install new corrosion-resistant coated metal base flashing, properly fastened and sealed at all joints and penetrations	SF	$3.36	$6.50	60	$591.60
Install new single-ply base flashing membrane, integrated and sealed to new coated metal flashing per manufacturer requirements	EA	$46.57	$21.70	60	$4,096.20

Continued on next page...

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Total Cost for Base Flashing Coated Metal					**$5,443.80**
Total Cost times 1.38 to reflect NYC markup					**$7,512.44**

3.3 Base Flashing Coated Metal (Low Severity)

During the inspection, 40 instance(s) of base flashing coated metal (low severity) were identified, requiring remediation across 40 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Remove existing single-ply base flashing and coated metal at defect location, including deteriorated sealant and fasteners	SF	$1.10	$5.20	40	$252.00
Repair or replace any deteriorated substrate beneath flashing to ensure sound base for new installation	SF	$1.10	$5.20	40	$252.00
Install new corrosion-resistant coated metal base flashing, properly fastened and sealed at all joints and penetrations	SF	$3.36	$6.50	40	$394.40
Install new single-ply base flashing membrane, integrated and sealed to new coated metal flashing per manufacturer requirements	EA	$46.57	$21.70	40	$2,730.80
Total Cost for Base Flashing Coated Metal					**$3,629.20**
Total Cost times 1.38 to reflect NYC markup					**$5,008.30**

3.4 Base Flashing Coated Metal (Medium Severity)

During the inspection, 110 instance(s) of base flashing coated metal (medium severity) were identified, requiring remediation across 110 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Remove existing single-ply base flashing and coated metal at defect location, including deteriorated sealant and fasteners	SF	$1.10	$5.20	110	$693.00
Repair or replace any deteriorated substrate beneath flashing to ensure sound base for new installation	SF	$1.10	$5.20	110	$693.00
Install new corrosion-resistant coated metal base flashing, properly fastened and sealed at all joints and penetrations	SF	$3.36	$6.50	110	$1,084.60
Install new single-ply base flashing membrane, integrated and sealed to new coated metal flashing per manufacturer requirements	EA	$46.57	$21.70	110	$7,509.70
Total Cost for Base Flashing Coated Metal					**$9,980.30**
Total Cost times 1.38 to reflect NYC markup					**$13,772.81**

3.5 Base Flashing Membrane Material (High Severity)

During the inspection, 30 instance(s) of base flashing membrane material (high severity) were identified, requiring remediation across 30 feet. The following scope of work details the necessary remediation measures:

Scope Item	**Unit**	**Material Cost**	**Installation Cost**	**Quantity**	**Total Cost**
Detach and Dispose of Damaged or Deteriorated Single-Ply Flashing Membrane	EA	$74.03	$26.04	30	$3,002.10
Install New Single-Ply Flashing Membrane to Required Height with Proper Overlap, Fastening, and Sealing per Manufacturer Specifications	LF	$7.86	$19.53	30	$821.70
Apply Manufacturer-Approved Surface Coating to New Base Flashing Membrane	SF	$3.36	$6.50	30	$295.80
Total Cost for Base Flashing Membrane Material					**$4,119.60**
Total Cost times 1.38 to reflect NYC markup					**$5,685.05**

3.6 Base Flashing Membrane Material (Low Severity)

During the inspection, 20 instance(s) of base flashing membrane material (low severity) were identified, requiring remediation across 20 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Detach and Dispose of Damaged or Deteriorated Single-Ply Flashing Membrane	EA	$74.03	$26.04	20	$2,001.40
Install New Single-Ply Flashing Membrane to Required Height with Proper Overlap, Fastening, and Sealing per Manufacturer Specifications	LF	$7.86	$19.53	20	$547.80
Apply Manufacturer-Approved Surface Coating to New Base Flashing Membrane	SF	$3.36	$6.50	20	$197.20
Total Cost for Base Flashing Membrane Material					**$2,746.40**
Total Cost times 1.38 to reflect NYC markup					**$3,790.03**

3.7 Base Flashing Membrane Material (Medium Severity)

During the inspection, 70 instance(s) of base flashing membrane material (medium severity) were identified, requiring remediation across 70 feet. The following scope of work details the necessary remediation measures:

Scope Item	**Unit**	**Material Cost**	**Installation Cost**	**Quantity**	**Total Cost**
Detach and Dispose of Damaged or Deteriorated Single-Ply Flashing Membrane	EA	$74.03	$26.04	70	$7,004.90
Install New Single-Ply Flashing Membrane to Required Height with Proper Overlap, Fastening, and Sealing per Manufacturer Specifications	LF	$7.86	$19.53	70	$1,917.30
Apply Manufacturer-Approved Surface Coating to New Base Flashing Membrane	SF	$3.36	$6.50	70	$690.20
Total Cost for Base Flashing Membrane Material					**$9,612.40**
Total Cost times 1.38 to reflect NYC markup					**$13,265.11**

3.8 Debris Vegetation (Medium Severity)

During the inspection, 20 instance(s) of debris vegetation (medium severity) were identified, requiring remediation across 20 square feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Manually Clear and Dispose of Debris and Vegetation	LF	$0.00	$3.51	20	$70.20
Cut Out and Remove Deteriorated or Punctured Membrane Sections	SF	$2.62	$2.67	20	$105.80
Install Compatible Membrane Patch or Replacement Section with Proper Overlap and Sealing	SF	$2.62	$2.67	20	$105.80
Total Cost for Debris Vegetation					**$281.80**
Total Cost times 1.38 to reflect NYC markup					**$388.88**

3.9 Defective Seams (Low Severity)

During the inspection, 50 instance(s) of defective seams (low severity) were identified, requiring remediation across 50 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Remove loose or failed seam material and clean membrane surfaces adjacent to the seam using compatible cleaners	LF	$0.24	$0.39	50	$31.50
Apply compatible patch material (reinforced or unreinforced as appropriate) or self-adhering cover strip, ensuring patch extends at least 4 inches beyond defect with rounded corners	SF	$8.89	$6.41	50	$765.00
For thermoplastic membranes (TPO/PVC): Heat-weld patch or seam tape to membrane using hot-air welder and silicone roller	SF	$2.62	$2.67	50	$264.50
For EPDM membranes: Apply membrane primer, seam tape, and adhere patch or cover strip, rolling for full contact	SF	$2.44	$0.98	50	$171.00
Apply compatible lap sealant along patch edges and at seam tape intersections as required	LF	$0.24	$0.39	50	$31.50
Total Cost for Defective Seams					**$1,263.50**
Total Cost times 1.38 to reflect NYC markup					**$1,743.63**

3.10 Flashed Penetration (Low Severity)

During the inspection, 5 instance(s) of flashed penetration (low severity) were identified, requiring remediation across 5 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Remove deteriorated or failed flashing materials, including loose or incompatible sealants, sleeves, and clamping bands	SF	$1.10	$5.20	5	$31.50
Install new compatible single-ply flashing (e.g., EPDM, TPO, or PVC) with integrated flange or pre-formed boot at penetration	LF	$4.07	$9.76	5	$69.15
Secure flashing with manufacturer-approved mechanical fasteners with gaskets or clamping bands as required	EA	$0.28	$0.64	5	$4.60
Seal all joints, seams, and fastener heads with compatible, manufacturer-approved sealant	LF	$0.24	$0.39	5	$3.15
Install reinforcing fabric or additional membrane as required at complex or high-movement penetrations	SF	$2.62	$2.67	5	$26.45
Apply liquid-applied flashing system with embedded polyester fabric at irregular penetrations or where specified	SF	$1.10	$5.20	5	$31.50
Total Cost for Flashed Penetration					**$166.35**
Total Cost times 1.38 to reflect NYC markup					**$229.56**

3.11 Flashed Penetration (Medium Severity)

During the inspection, 10 instance(s) of flashed penetration (medium severity) were identified, requiring remediation across 10 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Remove deteriorated or failed flashing materials, including loose or incompatible sealants, sleeves, and clamping bands	SF	$1.10	$5.20	10	$63.00
Install new compatible single-ply flashing (e.g., EPDM, TPO, or PVC) with integrated flange or pre-formed boot at penetration	LF	$4.07	$9.76	10	$138.30
Secure flashing with manufacturer-approved mechanical fasteners with gaskets or clamping bands as required	EA	$0.28	$0.64	10	$9.20
Seal all joints, seams, and fastener heads with compatible, manufacturer-approved sealant	LF	$0.24	$0.39	10	$6.30
Install reinforcing fabric or additional membrane as required at complex or high-movement penetrations	SF	$2.62	$2.67	10	$52.90
Apply liquid-applied flashing system with embedded polyester fabric at irregular penetrations or where specified	SF	$1.10	$5.20	10	$63.00
Total Cost for Flashed Penetration					**$332.70**
Total Cost times 1.38 to reflect NYC markup					**$459.13**

3.12 Improper Equipment Supports (Low Severity)

During the inspection, 10 instance(s) of improper equipment supports (low severity) were identified, requiring remediation across 10 square feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Lift or Temporarily Relocate Equipment to Access Membrane	SF	$178.00	$40.90	10	$2,189.00
Remove Wood Blocking or Inadequate Supports from Membrane Surface	SF	$0.16	$0.13	10	$2.90
Install Proper Equipment Support Stands or Raised Curbs with Protective Pads	TON	$1,606.00	$1,193.00	10	$27,990.00
For Low/Medium Severity: Patch Membrane Where Displaced or Minor Abrasion Occurred	SF	$0.16	$0.13	10	$2.90
For High Severity: Remove Damaged Membrane, Replace Insulation if Wet or Compromised, and Install New Membrane Patch with Overlaps per Manufacturer Specifications	SF	$2.62	$2.67	10	$52.90
Install or Repair Flashing at Equipment Supports to Ensure Watertightness	SF	$1.10	$5.20	10	$63.00
Total Cost for Improper Equipment Supports					**$30,300.70**
Total Cost times 1.38 to reflect NYC markup					**$41,814.97**

3.13 Interior Drains And Roof Level Scuppers (Medium Severity)

During the inspection, 5 instance(s) of interior drains and roof level scuppers (medium severity) were identified, requiring remediation across 5 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Remove loose or deteriorated flashing membrane and fasteners from drain and scupper perimeters	EA	$57.74	$19.53	5	$386.35
Install compatible single-ply flashing membrane, extending onto field membrane and up drain/scupper flange as per manufacturer requirements	LF	$4.07	$9.76	5	$69.15
Mechanically fasten flashing at perimeters using manufacturer-approved fasteners and plates	SF	$1.10	$5.20	5	$31.50
Heat-weld or adhere all seams and laps per system specifications	LF	$0.24	$0.39	5	$3.15
Seal all terminations and penetrations with manufacturer-approved sealant	LF	$0.16	$2.15	5	$11.55
Install or reattach clamping rings, strainers, and compression seals as required for watertightness	LF	$31.07	$2.73	5	$169.00
Reinstate insulation or fill voids as needed to match existing roof profile	SF	$3.57	$4.98	5	$42.75
Install walk pads or protection as required around frequently accessed drains/scuppers	LF	$217.00	$9.76	5	$1,133.80
Total Cost for Interior Drains And Roof Level Scuppers					**$1,847.25**
Total Cost times 1.38 to reflect NYC markup					**$2,549.20**

3.14 Membrane Support Deficiencies (Low Severity)

During the inspection, 10 instance(s) of membrane support deficiencies (low severity) were identified, requiring remediation across 10 square feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Cut and Remove Membrane Over Deficient Area	SF	$2.62	$2.67	10	$52.90
Install New Compatible Insulation or Cover Board	SF	$3.57	$4.98	10	$85.50
Install Compatible Membrane Patch or New Membrane Section Using Manufacturer-Approved Methods	SF	$2.62	$2.67	10	$52.90
Heat-Weld or Adhere Seams and Apply Edge Sealant as Required	LF	$0.24	$0.39	10	$6.30
Reinstall Ballast or Surface Material to Match Existing Assembly	CY	$43.30	$391.00	10	$4,343.00
Total Cost for Membrane Support Deficiencies					**$4,540.60**
Total Cost times 1.38 to reflect NYC markup					**$6,266.03**

3.15 Moisture Damage

During the inspection, 1440 square feet of sub-membrane moisture damage were identified. The following options are presented as possible remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Remove existing roofing membrane and insulation	SF	$0.00	$1.20	1440	$1,728.00
Install vapor barrier	SF	$0.08	$0.32	1440	$576.00
Install new insulation	SF	$5.60	$1.71	1440	$10,526.40
Install new roofing membrane	SF	$1.76	$1.35	1440	$4,478.40
Total Cost for Option 1					**$17,308.80**
Total Cost times 1.38 to reflect NYC markup					**$23,886.14**

3.16 Ponding (Low Severity)

During the inspection, 375 instance(s) of ponding (low severity) were identified, requiring remediation across 375 square feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Cut Out and Dispose of Compromised Membrane and Insulation	SF	$3.57	$4.98	375	$3,206.25
Place and Secure Tapered Insulation in Low Areas	SF	$1.78	$0.85	375	$986.25
Adhere or Weld New Membrane and Seal All Seams and Flashings	LF	$1.22	$5.20	375	$2,407.50
Total Cost for Ponding					**$6,600.00**
Total Cost times 1.38 to reflect NYC markup					**$9,108.00**

3.17 Ridges (Medium Severity)

During the inspection, 45 instance(s) of ridges (medium severity) were identified, requiring remediation across 45 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Cut and Remove Membrane Over Ridge Area	EA	$1.92	$22.32	45	$1,090.80
Remove Wet or Damaged Insulation	SF	$3.57	$4.98	45	$384.75
Size and Fit Compatible Replacement Insulation to Match Existing Thickness	SF	$1.64	$0.64	45	$102.60
Secure Replacement Insulation in Place	SF	$3.57	$4.98	45	$384.75
Install New Membrane Patch with Required Plies and Overlaps	SF	$0.00	$1.28	45	$57.60
Seal All Patch Edges and Seams to Ensure Watertightness	LF	$1.22	$5.20	45	$288.90
Total Cost for Ridges					**$2,309.40**
Total Cost times 1.38 to reflect NYC markup					**$3,186.97**

3.18 Splits (High Severity)

During the inspection, 3 instance(s) of splits (high severity) were identified, requiring remediation across 3 feet. The following scope of work details the necessary remediation measures:

Scope Item	Unit	Material Cost	Installation Cost	Quantity	Total Cost
Cut and Remove Damaged Membrane at Each Split	SF	$0.00	$1.28	3	$3.84
Install Compatible Membrane Patch or Replacement Membrane Extending Beyond Split with Rounded Corners	SF	$2.62	$2.67	3	$15.87
Secure Patch Using Appropriate Method (Hot-Air Welding or Adhesive/Seam Tape) to Ensure Full Bond and Watertightness	SF	$0.00	$1.28	3	$3.84
Apply Manufacturer-Approved Sealant at Patch Perimeter Where Required	LF	$0.24	$0.39	3	$1.89
Total Cost for Splits					**$25.44**
Total Cost times 1.38 to reflect NYC markup					**$35.11**