



January 2007

# An Approach to Conservation and Presentation of the Terrazzo Map Pavement of the New York State Pavilion in Queens, New York

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A Thesis in Historic Preservation Presented to the Faculties of the University of Pennsylvania in Partial Fulfillment of the Requirements for the Degree of Master of Science in Historic Preservation 2007.

Advisor: John Hinchman

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## **Comments**

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NEW YORK STATE PAVILION IN  
QUEENS, NEW YORK

Ann Thorkelson

A THESIS

In

Historic Preservation

Presented to the Faculty of the University of Pennsylvania in  
Partial Fulfillment of the Requirements of the Degree of

MASTER OF SCIENCE IN HISTORIC PRESERVATION

2007

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## *Acknowledgements*

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I would like to thank my advisor John Hinchman for his guidance, advice and support. His encouragement, patience and generosity with his time, were invaluable. I am grateful for the countless hours he spent helping me with technical challenges and offering his insight. His enthusiasm for this topic was contagious.

I would also like to thank my reader Frank Matero, for the opportunity to participate in the New York State Pavilion project and for his encouragement, and direction throughout the year. His advice and insight were a vital part of the completion of this thesis.

Last but not least I would like to express my gratitude to my classmates for all of their support, companionship, and sense of humor.

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**CHAPTER 1: INTRODUCTION**

Philip Johnson's New York State Pavilion, is one of the few remaining structures from the 1964-1965 World's Fair in Queens New York, and retains one of its main attractions, the terrazzo map pavement depicting a 1960's Texaco road map of New York State. The design for the terrazzo pavement consisted of 567 4'x 4' terrazzo tiles, depicting all of the features found on the map including the roads, signs, bodies of water, place names, and the locations of the Texaco gas stations in the State of New York. The Pavilion was designed to showcase exhibitions about New York State, and included three observation towers, a cylindrical movie theater called the Theaterama, and the Tent of Tomorrow, where the terrazzo pavement was located. Additionally, the Theaterama showcased art work by emerging Pop Artists such as Andy Warhol and Roy Lichtenstein as part of the first public, large scale exhibition of Pop Art, of which the terrazzo map pavement was and still is the largest example. Although the Pavilion and the pavement were intended to be temporary, they remain standing today in a state of deterioration, awaiting a decision regarding their future and hopefully their preservation.

The preservation issues surrounding the Pavilion and its terrazzo pavement must address how to conserve a modern ruin and reconcile original intent, its subsequent fate, and the change in reception over time. While the decision to leave the New York State Pavilion standing reflected the positive public response to the pavilion, it in no way assured its long term protection. Limited maintenance contributed to the current state of

deterioration and this neglect coupled with its current physical condition; require the public to consider a future for a place that is a shadow of its former self. The argument for preserving the New York State Pavilion and its terrazzo floor must take into account its glorious past as well as the last 40 years of its life. Making a decision to preserve something acknowledges its past and present value as well as a willingness to accept it for what is it is today and the role that conservation plays in stabilization and presentation.

Age works in its favor and also works against the structure. Romantic notions of ruins and the imagination's willingness to envision what once was, is powerful in the public's ability to accept and cherish something that has suffered physically. Intervention must consider the impact that it will have on the reception of the place and how to acknowledge the original floor while treating the present floor.

This thesis will address the conservation and display issues facing the terrazzo pavement of the New York State Pavilion and consider the potential causes and manifestations of deterioration present on the pavement. The first part of the thesis will address the intervention and conservation options for the terrazzo pavement, based on approaches used by the terrazzo industry and those used by the field of mosaics conservation. The difference between preservation and restoration will be addressed through the philosophies and approaches taken by both fields and a discussion of appropriate use with regard to the unique terrazzo pavement of the New York State Pavilion.

The second part of the thesis will address the present conditions affecting the pavement and how they relate to the design intent, original construction, environment, manufacture, and subsequent neglect. An overall conditions assessment of the entire map was conducted as well as an intermediate level assessment of the forty tiles that make up Long Island with the intent of correlating the two surveys to inform the overall condition of the pavement and the manifestation of the conditions on a representative portion of the map.

The goal of this thesis is to provide a framework for intervention and assessment by addressing the conservation and display issues facing a culturally significant and unique terrazzo pavement both for its design, state of deterioration, and place within the context of the 1964-1965 World's Fair and New York History.

## CHAPTER 2: CONTEXT

The terrazzo floor map of the New York State Pavilion is a product of its time, its location, and of its extended life. Its importance is reflected in its context which is the structure of the New York State Pavilion, the 1964-65 World's Fair, New York City, and cultural changes in America. Its enduring presence and concurrent deterioration is a testament to the public's interest and fascination with a symbol and relic of its city's recent past. As one element of a larger structure and entire landscape, the terrazzo floor map is one of the few iconic elements from the Fair that remains in context and together with the Unisphere contributes to a dense precinct that constitutes a rich cultural landscape of the tangible remains of the Fair. In order to address the map as it is today, it is necessary to analyze how the pavement came to be created, its extended life, subsequent decline, and lasting impression.

### 2.1 The World's Fair and New York City

The 1964-65 World's Fair was a follow up exposition to the 1939-40 World's Fair on the newly created Flushing Meadows Park located on the former Corona garbage dump. This transformation was one of many development projects promoted by Robert Moses, Fair President, for the city of New York, such as the construction of the Triborough Bridge, linking Queens to the rest of the city, the Midtown tunnel, and the Grand Central Parkway<sup>1</sup>. In the 25 years since the previous fair, New York City had undergone major transformations of its urban landscape. It emerged from World War II

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<sup>1</sup> George J. Lankevich, *American Metropolis: A History of New York City*. (New York: New York University Press, 1998), p177.

with a booming industrial economy and a shifting population as people moved to the suburbs and commuted into the city and foreigners immigrated.<sup>2</sup> The building boom in the 1950's made way for office buildings and a white collar economy but the city also suffered from economic decline. The major building projects in New York City also included the controversial slum clearance led by Robert Moses beginning in 1948 and continuing into the 1960's.

The earlier fair captured the public's fascination with the "World of Tomorrow", its theme, and showcased future achievements and aspirations, a much welcome shift from the depression years.<sup>3</sup> By contrast, the fair of 1964 was organized at a time when optimism for the future was clouded by social tensions, changes in the urban demographic, the ubiquity of mass produced products, and the political climate. "If 1939 was the promise, 1964 was the fulfillment-but a fulfillment already crumbling as the crowds made their way through Flushing Meadow."<sup>4</sup>

## 2.2 New York State Pavilion

The surviving buildings, monuments and landscapes of the 1939-40 World's Fair and 1964-65 Fair are powerful remnants of consciously ephemeral events. The New

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<sup>2</sup> George J. Lankevich, *American Metropolis: A History of New York City*. (New York: New York University Press, 1998), pp.182

<sup>3</sup> Morris Dickenson. "From the Thirties to the Sixties: The New York World's Fair in its own Time". In *Remembering the Future: The New York World's Fair From 1939 to 1964*. (New York: Rizzoli, 1989), pp.22

<sup>4</sup> *Ibid.*, 26.

York State Pavilion was and is an exceptional example of this, as evidenced by the interest it attracted during and after the fair, both at its height and during its forty year decline. During the fair it received much attention and praise both for its multiple structures as well as for its display of pop art.<sup>5</sup> The pavilion consisted of three observation towers which were the tallest structures at the fair, the cylindrical theater called the Theaterama and the “Tent of Tomorrow” which housed the terrazzo floor map. (Figure 1 and 2).

Philip Johnson’s design provided an interesting juxtaposition of the previous fair’s fascination with the future and the contemporary pop art movement which departed from such idealism. In a social climate that was becoming disillusioned with optimism for the future, the New York State Pavilion was one last hurrah. The “Tent of Tomorrow”, harked back to the 1939 theme of “Building the World of Tomorrow” and embraced its role in the celebration of New York State, which was epitomized in the lofty towers that provided aerial views in all directions. At the 1964 dedication of the pavilion, Robert Moses expressed his view on the pavilion and the lasting impression he hoped it would have. “When, after you have entertained millions of visitors, you fold your tent like the Arabs and silently steal away. I hope that your towers may remain in the great future of the Flushing Meadow Park as the highest vantage point from which people in

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<sup>5</sup> Robert A.M.Stern, *New York, 1960: Architecture and Urbanism between the Second World War and the Bicentennial*. (New York: The Montacelli Press, Inc., 1995), pp1036

the future can reconstruct and visualize two World's Fairs and imagine the metropolis of the future."<sup>6</sup>

The 300 year anniversary of New York City was one of the original arguments for hosting another fair, and while it may not have been advertised as such, both the New York State Pavilion and the Panorama in the New York City Pavilion are celebrations of New York, then and now.

### 2.3 Pop Art at the Fair

The exterior of the cylindrical "Theaterama" was adorned with art by Andy Warhol, Roy Lichtenstein, Robert Indiana, and artists such as Ellsworth Kelly, Robert Rauschenberg, and James Rosenquist. While not all of the art present was defined as Pop art, the exhibition was recognized then and now as the first major public exhibition of Pop Art. (Figure 3).

The term "Pop art" was first coined in England in the early 1950's, referring to products of mass media, such as signs and billboards, and by the 1960's had come to include fine art that referenced and borrowed imagery from popular culture and consumerism.<sup>7</sup> "However, Pop art deals with materials that already exist as signs: photographs, brand goods, comics-that is to say, with precoded material. The subject matter of Pop art, at one level, is known to the spectator in advance of seeing the use the

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<sup>6</sup> Walter Carlson. "State Wins Praise for Fair Pavilion", *New York Times*, April 24, 1964, pp.1

<sup>7</sup> Lawrence Alloway. *American Pop Art*. (New York: The Whitney Museum of American Art & Macmillan Publishing Co., 1974), pp. 1



artist makes of it.”<sup>8</sup> While this may explain the literal use of recognizable imagery, the intent of pop art and its response to advertising and mass production was often one of observation, and mockery. The prevalence of consumer culture was all at once being acknowledged, celebrated, and condemned. Its impact lay in its recognition and new context and its audience was asked to question what it was seeing and why.

Art and advertising seem intricately intertwined. Both seem to have their finger on the pulse of society, and both act as conduits in their similar roles of ‘social communicators’. Moreover in the 60s, they borrowed freely from each other and often shared the same artistic talents. The difference is that art was protesting against the empty values of consumption, while advertising was promoting it.<sup>9</sup>

The inclusion of Pop art at the Fair was the counterpoint to the flashy, futuristic structure of the “Tent of Tomorrow”, propelling the pavilion and his vision into future. With the World’s Fair teetering on the edge of superfluous kitsch and dated ideas and hopes, the presence of pop art was a dose of reality. Pop art was emerging as an avant-garde expression and commentary on the state of advertising and consumerism. While it was becoming well known in the art world, it had yet to reach mainstream culture and the works were not as provocative as anticipated.<sup>10</sup> The exception was Andy Warhol’s piece, *Thirteen Most Wanted Men*, depicting known New York City gangsters, which were painted out at the request of State officials.<sup>11</sup> The work was considered offensive for the use of the New York City Police departments’ property, the most wanted list, and the

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<sup>8</sup> Ibid., pp.7

<sup>9</sup> Hazel G. Warlaumont, *Advertising in the 60s, Turncoats, Traditionalists, and Waste Makers in America’s Turbulent Decade*. (Westport, Connecticut: Praeger Publications, 2001), pp. 62

<sup>10</sup> Helen A. Harrison, “Art for the Millions, or Art for the Market?”, In *Remembering the Future: The New York World’s Fair From 1939 to 1964*. (Ed. Rosemarie H. Bletter.; New York: Rizzoli, 1989), pp.160

<sup>11</sup> Ibid, 157.

homoerotic undertones of Warhol's configuration.<sup>12</sup> The artist Robert Indiana contributed a piece called *EAT Sign*, a light up sign displaying the words "Eat" which hung on the exterior of the Theaterama for several seasons but the lights were turned off after the first day when confused fairgoers formed a line taking the work of art literally.<sup>13</sup>

Despite some of the early controversy, the exhibition did not have a tremendous impact but the presence and acknowledgment of an art form closely linked to current cultural changes is an important and insightful reference, if only in retrospect. The use of pop art on the New York State Pavilion was a commentary on what was popular both in terms of everyday culture and what was emerging from the art world.

#### 2.4 The Map as Pop Art

The notion of Pop art as a reflection of contemporary culture and known imagery was best represented and translated in the form of the Great Texaco road map pavement of the New York State Pavilion. It is still to date the largest road map in the world. The literal depiction of a map of New York State was part of the pavilion's celebration of the State and one that people could relate to and appreciate both during the fair and after. The map put the fair into a context by displaying all of the towns, roads, cities and parks that make up the state, and an arrow that indicated the location of the pavilion within the map and the State. (Figure 4). As a representation of a familiar image and one that is taken out of its usual context, the terrazzo floor map is more than just a floor but a work

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<sup>12</sup> Kristin Utter Fedders. "Pop Art at the 1964/65 New York World's Fair". (A Dissertation in History of Art, University of Pennsylvania, 2005),167.

<sup>13</sup> Ibid.,127.

of Pop Art in itself. “The meaning of a sign is changed by being re-contextualized by the artist.”<sup>14</sup> Unlike the works of art displayed at the fair which failed to excite the public, the terrazzo floor was an attraction that created a larger than life replica of an ordinary and highly recognizable image.

The significance of the terrazzo floor map as a piece of Pop art defines the way it is treated and valued both in terms of preservation and cultural value. While the value or significance that people may have seen in the map is clearly not reflected in any maintenance and care, it is an indication of its future consideration. The map is both a terrazzo floor and a piece of Pop art, and decisions regarding conservation need to acknowledge both.

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<sup>14</sup> Lawrence Alloway. *American Pop Art*. (New York: The Whitney Museum of American Art & Macmillan Publishing Co., 1974), pp. 9

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**CHAPTER 3: PRESERVATION OR RESTORATION, CONSERVATION AND  
DISPLAY ISSUES**

Preservation considerations for the terrazzo pavement of the New York State Pavilion should consider the map's present and past context, original design intent, the result of forty years of abandonment, and the needs of a contemporary presentation to the public. The current conservation plan calls for the removal of approximately twelve of the forty tiles that make up Long Island and the burial of the remainder of the map until a long term plan can be established and funded. This chapter will address some of the conservation and presentation issues facing the map, the options for presentation and the visual and experiential impact of a conservation intervention. (See Appendix B).

Potential treatment of the terrazzo tiles will consider the contemporary restoration approach employed by the terrazzo industry as well as intervention philosophies and techniques employed in the field of mosaics conservation. The different approaches applied by each group address many of the same concerns such as stability and legibility but with very different results. The approach to considering an appropriate method of intervention will be based on the goals for presentation, the nature of terrazzo as a material, and exemplary case studies as a precedent for intervention. Preserving the pavement in situ and ex situ will be explored as a way to address the ultimate question which is whether to treat the map as an artifact to be put on display or as a functioning floor.

### 3.1 Treatment as a Functioning Terrazzo Floor

The ancient tradition of terrazzo grew out of mosaics and has seen a resurgence in American construction beginning in the early part of the 20<sup>th</sup> century. Mosaics, which originated in Egypt and Alexandria, were traditionally made by arranging small pieces of stone or glass into a pattern in mortar.<sup>15</sup> Lithostrotum, floor mosaics, were divided into three subgroups by the Romans, to distinguish between the various techniques for creating imagery and geometric patterns. Eventually, the techniques were hard to distinguish from one another, and cruder forms of mosaic flooring emerged, not as a replacement, but as a simpler approach to creating a durable and aesthetically pleasing flooring material. Terrazzo is closely related to its 18<sup>th</sup> century predecessor, *pavimento alla Veneziana*, where marble pieces are placed close together in a mortar base.<sup>16</sup> Contemporary terrazzo is derived from *pavimento alla Veneziana* and a technique called *seminato*, in which irregular sized marble chips are sprinkled over a cement base, ground and polished. Terrazzo was first seen in the United States in the late 19<sup>th</sup> Century, but became popular in the early part of the 20<sup>th</sup> century when divider strips were introduced, preventing cracking and making for a more durable flooring material.<sup>17</sup>

Terrazzo can be both a utilitarian and decorative flooring technique most frequently used in building lobbies, grocery stores, and a variety of other public and

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<sup>15</sup> Walker C. Johnson, "Terrazzo", in *Twentieth Century Materials: History and Conservation*, (Ed. Thomas Jester, New York: McGraw Hill, 1995), pp. 234.

<sup>16</sup> Amel Chabbi. "Restoring a 20<sup>th</sup> Century Terrazzo Pavement: A Conservation Study of the Floor Map of the New York State Pavilion Queens, New York", (masters thesis, University of Pennsylvania, 2004), pp.16.

<sup>17</sup> Walker C. Johnson, "Terrazzo", in *Twentieth Century Materials: History and Conservation*, (Ed. Thomas Jester, New York: McGraw Hill, 1995), pp. 236.

private spaces for its durability and aesthetics. It is rarely seen in a state of decay quite like the floor in the New York State Pavilion which is perhaps why few comparable case studies have been found for its conservation. It is often used and viewed as a flooring material whose primary function is one of utility rather than as a work of art. This may explain the lack of literature that explores the philosophical and ethical issues involved in the conservation of significant terrazzo floors. The exceptions are decorative terrazzo floors whose design and imagery are often considered an important building feature. While the techniques for repairing decorative terrazzo floors do not necessarily differ from ordinary floors, there is of course a concern for the aesthetic appearance of the repair and the reintegration of any lost design.

### 3.2 Contemporary Terrazzo Repair

The National Terrazzo, Tile and Mosaic Association<sup>18</sup> (NTMA) has established the national standard for terrazzo maintenance, specifications for installation and construction. While the specifications refer to recently laid terrazzo and its upkeep, it provides a general framework for ongoing treatment of terrazzo floors and techniques for maintaining the finish.

Specifications by the NTMA for refinishing a terrazzo surface includes initial wet grinding first with fine grit stone (24 or finer) and sand followed by a courser (80 or finer) grit stone, all used with water. After the floor is cleaned off with water, grout can be applied by hand or with a machine. The grout mixture should consist of a Portland

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<sup>18</sup> The National Terrazzo Tile and Mosaic Association. [http: www.ntma.com](http://www.ntma.com)

cement with acrylic admixture with or without color to match the matrix. Grout is left to cure for 72 hours and is sanded with a fine (80 or finer) grit stone. A neutral cleaner is used and rinsed with water. Once dry, application in one or more coats of an acrylic water based sealer is recommended. Conventional terrazzo grinding machines are specified as the only grinding machines considered acceptable to use.<sup>19</sup>

Most literature on terrazzo acknowledges that cracking is the most common problem affecting terrazzo but little of that literature offers much in way of recommendations or a methodology for repair or conservation. Cracks appear when there is either movement or differential settlement of the structural support system.<sup>20</sup> When damage is severe, it is recommended to remove the deteriorated terrazzo and replace the entire section between the divider strips. When possible, an effort should be made to use the original aggregate and binder or a sufficient match.<sup>21</sup> All texts consulted, referenced The National Terrazzo, Tile and Mosaic Association for specifications rather than providing advice themselves. The lack of literature regarding conservation and repair suggests that terrazzo has yet to transcend its functionality and be appreciated as an art form or a major contributor to valued cultural property.

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<sup>19</sup> The National Terrazzo Tile and Mosaic Association. "Restoration of Terrazzo Finish". [http://www.ntma.com/05\\_specification.php](http://www.ntma.com/05_specification.php)

<sup>20</sup> Walker C. Johnson, "Terrazzo". In *Twentieth-Century Building Materials: History and Conservation*, (Ed. Thomas C. Jester, New York: McGraw Hill, 1995), pp. 238.

<sup>21</sup> Walker C. Johnson, "Terrazzo". In *Twentieth-Century Building Materials: History and Conservation*, (Ed. Thomas C. Jester, New York: McGraw Hill, 1995), pp, 239.

### 3.3 Decorative Terrazzo Floors

Decorative terrazzo floors depicting unique imagery and abstract patterns present a different set of problems when damage occurs, resulting in a visual disruption to the design. The ability of terrazzo contractors to match the binder, chips, and their respective colors and textures dictates to what degree the visual disruption of a repair can be minimized without complete replacement. The NTMA website does not specifically list contractors that specialize in repair but does give NTMA Awards for exceptional projects, several of which were restoration projects.

### 3.4 Case Studies

#### *3.4.1 St. Joseph's Public Library, Missouri*

A featured project on the NTMA website is the restoration of a terrazzo floor in St. Joseph's Public Library in St. Joseph's, Missouri. The floor dates from 1900 and was discovered during the removal of carpet as part of the overall renovation of the building.<sup>22</sup> The floor was cracked and de-bonded from the surface and the terrazzo contractor who was called in recognized the value and aesthetic quality of floor and advised repair and restoration.<sup>23</sup> The restoration approach involved stabilizing the floor by injecting epoxy to re-adhere detached sections to the substrate, re-grouting the cracks and epoxy injection points with a tinted grout, and grinding and polishing the floor. (Figure 5 and 6). The goal of the project was to stabilize and visually minimize the

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<sup>22</sup> The National Terrazzo and Mosaic Association. *2005 Honor Awards: St. Joseph's Public Library*. [http://www.ntma.com/07\\_2005\\_honor\\_awards\\_desc.php?job\\_name=stjoseph1](http://www.ntma.com/07_2005_honor_awards_desc.php?job_name=stjoseph1)

<sup>23</sup> Ibid.



damage while bringing out the colors and pattern of the original design. While the repairs are still slightly discernable, the intention was to emphasize the original floor, not the repair, and restore this original feature of the building. The techniques used for repair follow the procedure outlined on the NTMA website and discussed above. The goal was to match the original color and texture using a tinted matrix and marble chips that matched the size and color of the original floor. This approach to terrazzo restoration is a standard approach taken by companies that make repairs to damaged terrazzo and recommendations for repair as specified by the National Terrazzo and Mosaic Association.

#### *3.4.2 Hollywood Walk of Fame, Los Angeles*

The Hollywood Walk of Fame is a very different sort of terrazzo floor with a unique history and set of deterioration problems ranging from surface cracking to deformation and differential settlement of the pavement. The floor was created in 1958 to honor celebrities with a terrazzo star bearing their name, in the sidewalk on Hollywood Boulevard, CA. To receive a star, a celebrity must be nominated and reviewed by the Hollywood Chamber of Commerce who makes a final decision based on professional achievement, number of years in the field and community contributions.<sup>24</sup> The nominee must agree to attend a public dedication ceremony and the cost of a star is presently \$25,000, a recent 40% increase, which is needed to pay for maintenance and future

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<sup>24</sup> The Hollywood Chamber of Commerce. <http://www.hollywoodchamber.net/icons/history.asp>

repairs<sup>25</sup>. With over 2,000 stars, the Walk of Fame is a major tourist attraction where visitors frequently seek out the terrazzo stars of their favorite celebrities. Each pink terrazzo star is outlined in brass within a square background of black terrazzo. The celebrity names, also in brass, are within the pink star.

Beginning in 1994 with the construction of an underground metro line, the Hollywood Walk of Fame began to display cracking and “buckling”.<sup>26</sup> (Figure 7). Past and continuing damage from the metro, and potential thermo-expansion problems are the two opposing speculations as to the cause of the problem, but neither has been proven yet. While discovering the source of the problem is key to preventing future damage, the intermediate solution has been to replace the 121 damaged black terrazzo squares and an additional 16 that have stars in them, in time for the 2007 Oscars.<sup>27</sup>

The significance of the Hollywood Walk of Fame lies in the names that appear on the sidewalk, the history of the entertainment industry, and the fascination with celebrities that keeps tourists and fans coming back day after day. Just as the Hollywood sign has become a symbol for Hollywood, Los Angeles and California, the Hollywood Stars are a symbol of the glamour that people associate with the film industry, Hollywood personalities and the event of the public dedication in which the movie star was present and personally unveiled their star. Since 1960, four stars have been stolen from the

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<sup>25</sup> Bob Pool. “For the Oscars, they want the buckling to stop here.”, *The Los Angeles Times*, November 9, 2007, pp.1.

<sup>26</sup> Ibid.

<sup>27</sup> Ibid.,2

Boulevard including those of Kirk Douglas, Jimmy Stewart, and most recently in 2005, Gregory Peck.<sup>28</sup>

The decision to replace the stars, rather than repair them or wait until a long term plan can be established speaks to the power of the floor and to the value of the terrazzo material. There is little question of the value of the floor to Hollywood, but the original material at this point in time was secondary to what the floor represented and symbolism trumped authenticity.

### 3.4.3 *The East Columbia Building, Los Angeles*

This final terrazzo case study involves the conservation of a 1930's terrazzo floor by a conservation company that specializes in fine art and architectural conservation. The approach they took to the decorative terrazzo floor in the East Columbia Building in Los Angeles, was to repair the damage with the goal of making the repairs visually inconspicuous but with the intent of respecting the original design and material compatibility.

The East Columbia Building is a thirteen story Art Deco building designed by Claud Beelman, and opened in 1930 as the new headquarters of the Eastern Outfitting Company and Columbia Outfitting Company. It is clad in turquoise terra cotta with deep blue and gold terra cotta accents.<sup>29</sup> The building which is listed on the National Register

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<sup>28</sup> Bob Pool, "A Hollywood Star is Torn.", *The Los Angeles Times*, B3; California Metro; Part B; Metro Desk, Nov. 30, 2005.

<sup>29</sup> The LA Conservancy, Walking Tours, Eastern Columbia Building.  
[http://www.laconservancy.org/tours/downtown/eastern\\_columbia.php4](http://www.laconservancy.org/tours/downtown/eastern_columbia.php4)

of Historic Places underwent a renovation in 2006 which converted the building into luxury condominiums. The terrazzo lobby and exterior terrazzo sidewalks were conserved by Sculpture Conservation Studios in Los Angeles.

The interior terrazzo floor had been covered by carpet prior to restoration and the damage consisted of various size holes, some of which were drilled into the floor to accommodate pipes, cracks that penetrated the terrazzo topping, pitting, and fine cracks. (Figure 8).

Sculpture Conservation Studio is a small company with less than 10 employees that do conservation work on art objects and architecture. Andrea Morse, the director, has a background in fine art conservation. In a phone conversation with her in March 2007, she explained the conservation approach that Sculpture Conservation Studio took to the preservation of the Eastern Columbia Building Terrazzo. The goal of the project was to restore the terrazzo to its appearance prior to damage and the repairs were intended to match the color and texture of the original appearance of the floor.<sup>30</sup>

Terrazzo manufactures were consulted about the construction method used, and the most appropriate materials and techniques for making repairs. Epoxy was used for touch ups for small cracks on the interior terrazzo but not the exterior pavement due to the yellowing of the epoxy outdoors. The steps for conservation taken to the interior pavement included grinding the floor to remove previous coatings, the deepening of

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<sup>30</sup> Sculpture Conservation Studio's approach to the East Columbia Building terrazzo restoration project was discussed with Andrea Morse, the company owner, on April 7, 2007.

cracks and holes prior to filling them with a mortar, the addition of marble chips, grinding the floor level with the existing terrazzo, coating the floor with a tinted mortar to fill in fine cracks, polishing, application of an acrylic sealer, and finally a hard wax coating. Holes and cracks were deepened to ensure good adhesion of the mortar mix but were not widened which would have resulted in further loss of the original material. The mortar used to make fills consisted of pigment, cement, sand, water, acrylic emulsion, followed by marble chips matching the original terrazzo mix in color and size. The process used for making fills involved an initial layer of mortar followed by marble chips pressed down into the mortar. This process was repeated three times till the void was filled and left to dry for 12-24 hours prior to grinding the surface level with the floor.

The imagery of the interior terrazzo is a repetitive pattern of sunbursts and surrounding borders, while the exterior terrazzo depicts a repetitive Chevron symbol. To compensate for loss of the pattern imagery, the entire floor was photographed and the photos montaged together, prior to any intervention, to observe the repetition of the pattern and how it transitioned throughout the entire floor. A conscious effort was made to respect the original construction method by using compatible materials and repair techniques that followed the steps used in constructing the terrazzo originally. The goal of the repairs was to match as closely as possible the original floor and minimize the visual impact of the repairs. (Figure 9). In addition to consulting terrazzo companies that were familiar with this construction method, manuals such as the terrazzo specifications

by the General Services Administration Historic Preservation Technical Procedures were consulted.<sup>31</sup>

### 3.5 Terrazzo Conservation: A Limited Approach

While the three case studies represent very different projects and values what they share in common is a restoration approach where the goal is to have the floor reflect its original appearance and to minimize the effects of age. Specifications for repair come from the National Terrazzo and Mosaic Association but there is little material out there that discusses an approach, philosophy, or cited examples of good repair versus bad repair. The implications of recreating areas of loss are an important issue that deserves more attention in the literature. Procedures or guidelines for loss compensation regarding patterns as well as imagery are absent. While patterns can be predictable especially when a significant portion of a pattern remains intact, a unique design, such as a figure, may not provide enough evidence of the original configuration to replicate with certainty, what was there before.

Decisions about what materials to use are left up to the discretion of the contractor and architect. Grinding terrazzo floors to remove previous coatings or to reveal the original colors in the terrazzo mix is often the first step in the restoration process. The NTMA specifies this in their recommendations for restoration, while the General Services Administration Historic Preservation Technical Procedures cautions that this approach is an extreme measure and should only be done if a coating cannot be removed

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<sup>31</sup> Sculpture Conservation Studios approach to the East Columbia Building terrazzo restoration project was discussed with Andrea Morse, the company owner, on April 7, 2007.

with solvents.<sup>32</sup> Grinding terrazzo floors removes a thin layer of the terrazzo and as an irreversible method, should consider the future implications of the repair being made and the longevity of treatments.

The General Services Administration (GSA) has partnered with the National Center for Preservation Technology & Training (NCPTT), to research an alternative method to the process of stripping, waxing and buffing that many historic terrazzo floors have been subjected to over the years.<sup>33</sup> They are exploring the use of vitrification to alter the top micro layer of the terrazzo, making it harder, stronger and more water resistant. The research is concerned with the reversibility of the treatment, the level of moisture mobility within the terrazzo that it would allow for, and the appropriateness of a shiny mirror appearance that vitrification produces. The results of this study may provide new information about the appropriate treatment of terrazzo and bring to the forefront of restoration procedures, the important questions regarding the visual and ethical impact of making repairs to terrazzo.

While restoration according to the terrazzo industry specifications can be appropriate and well executed, the current approach does not address all of the issues that the pavement of the New York State Pavilion faces.

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<sup>32</sup>General Services Administration Historic Preservation Technical Procedures: 400 Terrazzo <http://w3.gsa.gov/web/p/HPTP.NSF/All%20Procedures?OpenView&Start=1&Count=30&Expand=9.8#9.8>

<sup>33</sup> NCTPP Notes, Issue 46, "Historic No-Wax Floors" <http://www.ncptt.nps.gov/NCPTT-Notes/Issue-46/Historic-No-Wax-Floors.aspx>

### 3.6 The New York State Pavilion Pavement

The New York State Pavilion was designed for the 1964-65 World's Fair by architect Philip Johnson, to showcase exhibitions celebrating New York State. The pavilion was one of the most well received pavilions at the fair by both architecture critics and the general public. Philip Johnson was a well know architect at the time and in 1964 he not only designed the New York State Pavilion, but the State Theater at Lincoln Center and the remodeled Museum of Modern Art. In an article in the New York Times, Ada Louise Huxtable praised Johnson's elegant approach to architecture and the use of timeless values to create contemporary buildings.<sup>34</sup> Johnson's inclusion of Pop Art on the exterior of the Pavilions Theaterama, and the creation of the terrazzo map, the largest cartographic depiction at the time and an early Pop Art Public work, was a reflection of Johnson's awareness of contemporary culture and vision for the future. The terrazzo map pavement was a product of its time and the dizzy energetic period of the 1960's in New York City. Today its ruinous condition reminds us of the over forty years that have elapsed.

To take recommendations from the terrazzo industry would simply mean repair or replace. While these are options that the industry has employed successfully in some cases, this particular terrazzo floor is a unique monument in time and place. Its complicated associations and current state suggest preservation may be more appropriate than restoration. The story of how the floor was made, its context within the 1964-65

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<sup>34</sup>Ada Louise Huxtable. "He Adds Elegance to Modern Architecture", *New York Times*, May 24, 1964.



World's Fair and its forty year abandonment are important aspects of its history that are important to acknowledge.

The field of mosaic conservation has a long history of philosophical approaches and intervention techniques that have changed over time as conservators have themselves become more sensitive to the issues of site context and integrity and the implications of display. The use of materials, aesthetic considerations, and philosophical approach to intervention has significant relevance to the ultimate interpretation and display of the map.

### 3.7 Treatment as a Historic Floor

The map pavement of the New York State Pavilion bears comparisons to mosaic floors both in terms of its construction and modes of deterioration. Mosaics are the precursor to terrazzo and they share a long history of use for both durability and aesthetics. Terrazzo is rarely seen in a damaged state like the New York State Pavilion and in this respect the terrazzo pavement is more akin to an ancient mosaic than a forty year old terrazzo floor. The treatment of the site is not limited to questions about how to conserve or restore the floor but how to interpret the entire pavilion to the public. The structure as it remains today as well as the original use of the pavilion is integral to the presentation and conservation approach to the terrazzo floor.

Given its ruined context, the pavilion's map pavement is similar to mosaics in archaeological sites. Treating areas of loss, providing shelter, and display and presentation to the public are important considerations that have evolved through the

development of approaches to mosaic conservation. The treatment of a 20th century terrazzo floor as a work of art in an advanced state of deterioration and within a ruin context privileges the originality of the work and its age as indicators of authenticity rather than the completeness of design form or newness value. Whatever the decided outcome, the approach will affect future use and maintenance.

### 3.8 Mosaic Conservation

Although mosaic conservation has a long history, technical and interpretive approaches continue to evolve. These changes over the last fifty years as well as just the last ten reflect the willingness of the field to look back on previous work as a way of informing present and future decisions. A long treatment history allows conservators to observe the impact of interventions over time. Minimal intervention including in situ conservation has clearly dominated recent trends.

The International Committee for Conservation of Mosaics is the premier organization for setting standards and organizing conferences and debates regarding the approach to conservation of mosaics. Preserving mosaics in situ has become the assumed approach to conserving mosaics;<sup>35</sup> however it is also recognized that it is not always a feasible or practical option. “*In situ* conservation of mosaics does not refer to the place where the work is treated, and it refers, even less, to whether or not the mosaic is replaced

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<sup>35</sup> International Committee for the Conservation of Mosaics. <http://www.iccm.pro.cy/history.htm>

in its original position. *In situ* conservation means respecting and preserving all the cultural values of the monument, including historical, technical and material ones.”<sup>36</sup>

A holistic approach to conserving mosaics while considering the context and entirety of the site should be translated to the pavement of the New York State Pavilion. While the future of the pavilion is uncertain, conservation of the terrazzo map pavement should assume that it will remain a key architectural element of the site. Fortunately the pavement was made as an assembly of tiles allowing temporary removal of each tile for individual conservation as well as re-grading and drainage mitigation for the site prior to reinstallation at a later date. Removal of the tiles for off site treatment will also facilitate the structural repairs to the pavilion and remove the need to provide temporary protection to the floor.

### *3.8.1 Treatment of Lacunae: Mosaics as the Precedent*

The structural and visual integrity of the map pavement of the New York State Pavilion are compromised by the damage that is currently affecting the floor. Cracks, incipient spall, deformation, and loss are the primary conditions present and require considerations that will stabilize the tiles and reintegrate the image of the map connecting the tiles to each other. While each tile represents a unique portion of the map, any effort to compensate for loss must consider both the individual tile and its role in the map as a whole. While specific conservation efforts are focused on Long Island for the pilot

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<sup>36</sup> Roberto, Nardi. “The treatment of mosaics *in situ*”, In *Mosaics make a Site, The Conservation in situ of Mosaic on Archaeological Sites: Proceedings of VIth International Conference of the International Committee for the Conservation of Mosaics, Nicosia, Cyprus, 1996*. (ICCM: Italy, 2003), pp. 189.

project, it is important to develop a methodology that can be applied to any of the tiles of the map and reflect a clear vision and interpretation of the site.

Loss compensation for mosaics can take several forms depending on the condition of the mosaic, the degree and type of loss, and the goal of conservation work, i.e., final display. Consideration should be given to both stabilization and treatment of damaged areas as well as concern for the aesthetics of the mosaic.<sup>37</sup> The size and location of a lacuna will determine how to address the area of loss and whether or not it will be treated differently than larger or more prominently placed lacunae. While many decisions regarding loss are site specific, examples of previous interventions provide feasible options for loss compensation with similar considerations. The current options and previous used methods for compensating loss include leaving the loss in place and repairing bedding mortar, filling loss with a neutral colored mortar, replacing with ancient tesserae, replacing with new tesserae, replacing with new tesserae outlined in either metal or colored tesserae, replacing with new tesserae of a different color, and raising or recessing a fill to indicate the repair.<sup>38</sup> While the use of a treatment is decided on a case by case basis, there are projects that provide good examples for developing methodologies and making appropriate decisions.

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<sup>37</sup> Alessandro Lugari, “The Treatment of Lacunae in Mosaics: Research Towards A Methodology” in, *Mosaics: Conserve to Display? VII Conference International Committee for the Conservation of Mosaics*. (Arles: ICCM, 2003), pp.423

<sup>38</sup> *Ibid.*, 425.

### 3.9 Case Studies: Mosaics

Decisions regarding reintegration and presentation must consider the reuse of original materials, new materials, and the impact of damage and subsequent intervention to the reception of the whole. The conservation of the Last Judgment Mosaic, St. Vitus Cathedral, Prague and the mosaics at the Worcester Art Museum in Massachusetts provide useful examples of loss compensation and presentation. Each project developed a methodology for determining an appropriate intervention with consideration for the public reception of the mosaic and the original design and intent.

#### *3.9.1 Conservation of the Antioch Mosaics*

The conservation of the Antioch mosaics at the Worcester Museum of Art addressed various degrees and kinds of loss in conjunction with a concern for presentation of the mosaics. The Triclinium mosaic panels were removed after excavation in the 1930's and backed with concrete and iron mesh. The goal of the conservation project which lasted from 1998 to 2000 was to reintegrate the areas of loss that detracted from the integrity of the mosaics' imagery with the intention of presenting them in a museum setting.<sup>39</sup>

The challenge was to compensate for loss within the six floor fragments and to connect them to each other within the context of the room of which they were once a part. The solution for loss compensation within the fragments was to replicate the continuous

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<sup>39</sup> Lawrence Becker and Christine Kondoleon, Editors. *The Arts of Antioch: Art Historical and Scientific Approaches to Roman Mosaics and a Catalogue of the Worcester Art Museum Antioch Collection* Worcester Art Museum, (Princeton: Princeton University Press, 2005), pp.90

geometric patterns that could be predicted, by filling them with molded plaster that mimicked the texture of the tesserae surface.<sup>40</sup> The plaster was painted a lighter value to distinguish between the original tesserae and the new additions. Figural imagery whose original configuration was unknown, was simply filled with a tinted mortar. To retain the scale of the original floor dimensions and connect the fragments, the geometric pattern surrounding the six fragments was recreated using a black and white photo reproduction of the pattern. (Figure 10). A low wall surrounded the entire floor to reference the scale of the room with a recess where a door opening would have been, placing the floor and its original fragments in a context.

### 3.9.2 Conservation of the Last Judgment Mosaic

The conservation of the Last Judgment Mosaic on the façade of the St. Vitus Cathedral in Prague is a very different project from both the Antioch floor mosaics and the New York State Pavilion, but develops a methodology whose basic structure is quite relevant. The Last Judgment Mosaic, located over the main entrance to the Cathedral, dates from the medieval period and is considered one of the most significant exterior mosaics north of the alps l.<sup>41</sup> The conservation problems were focused on the deterioration of the glass tesserae which were in turn contributing to the deterioration of the gold leaf beneath.

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<sup>40</sup> Ibid.,91

<sup>41</sup> Francesca Pique and Dusan C. Stulik, ed. *Conservation of the Last Judgment Mosaic, St. Vitus Cathedral, Prague*. (Los Angeles: Getty Conservation Institute, 2004), pp.79

In following the values based approach of the Burra Charter, the project divided itself into four major steps whose ultimate goal was preservation of the cultural significance and architectural context, minimal and/or reversible intervention, thorough documentation, and long term management and maintenance.<sup>42</sup> The four phases of the project included identification and description, assessment and analysis, response, and implementation. Detachment was ruled out in favor of conserving the mosaic in situ, once it was determined that the mosaic was structurally stable and the main concern was the deterioration of the glass tesserae and the loss of the gilding.

The visual impact of the loss of the gold and its significance to the mosaic, determined how the conservation team would proceed. The mosaic was a representation of Heaven and the entrance below the mosaic is called the Golden Gate, which gave the presence of gold tremendous significance. Decisions were made to re-gild the background, non background areas were gilded if it was certain that they had once had gold, and tesserae with traces of gold remaining were left as is. Gold was applied sparingly to the newly gilded tesserae, so that the overall appearance read as a gold surface, but did not stand out as new or overly restored. (Figure 11 and 12). The significance of the gold color determined the level of intervention and the authenticity of the remaining gold was respected simultaneously. The importance of unifying the wall did not require that each tessera be perfectly reintegrated to suggest the overwhelming presence of gold.

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<sup>42</sup> Ibid.,80.

While the two case studies represent very different mosaics and conservation techniques, the choices that were made about how to represent the original design and intent of the mosaics stems from a similar philosophy and methodology. Communicating the design and significance of the mosaics while respecting the original materials guided the interventions. Developing a methodology for preserving original material and the introduction of new materials was critical to the display of the mosaics and how they would be perceived by an audience. For each project, viewing distance influenced the solution for loss compensation.

### 3.10 Presentation of the Terrazzo Pavement to the Public

The approach to preservation and conservation to the terrazzo pavement of the New York State Pavilion is dependant on the physical context of the map, the presentation objective to the public, and the options for its future. In order to develop a methodology, intervention philosophy, and eventually treatments, the options for preserving the map need to be clearly defined. There are four major options for conservation and display including preserving the map in situ, moving it to another location, conserving the map as a functioning floor to be walked on, and conserving it as an object to be viewed. Each scenario presents pros and cons and raises questions about how the pavement might be experienced and received by an audience, how time will play a role in its reception, and the visual impact of each situation. The options will be presented by their advantages and disadvantages in terms of implementation, necessary intervention approach and the impact each scenario will have on the presentation experience.



*3.10.1 Presentation in situ*

The structure of the New York State Pavilion and the context of the 1964-65 World's Fair are central to the floor's significance. Both the pavement and Pavilion structure were designed by Philip Johnson to celebrate the State of New York and removing the map would sever the connection and original design intent of the Pavilion as a whole. The context is both physical and historical. The pavement is part of a larger context which is the 1964-65 World's Fair. The map is a product of its time, in which optimism for the future was reflected in the celebratory architecture of the Pavilion and simultaneously referenced the contemporary Pop art movement, of which the floor map is the largest example. Leaving the pavement in situ will allow the visitor to experience the map in the context it was intended to be seen which is an entire Pavilion dedicated to New York, one of the few remaining structures from the fair.

The proximity to the other remains of the Fair in particular the Unisphere, the largest globe in the world and the Panorama of New York City, put the pavement into the context of the Fair and the Fairgrounds and link it to two other iconic remnants of the 1964-65 Fair. The connection between the pavement, the Unisphere, and the Panorama is a three part attraction and the New York State Pavilion could potentially take advantage of the visitors to the Queens Museum, where the Panorama is housed, and the Queens Theater, in the former Theaterama, part of the original New York State Pavilion structure.

As a part of the Pavilion, the future of the pavement is dependant on the stabilization of the Pavilion. Until a decision is reached about what to do with the

structure, when and how to preserve it, conservation work cannot take place on the pavement in its current location.<sup>43</sup> In addition to stabilization, the floor is currently exposed to the elements and has been subjected to standing water and plant growth due to the missing roof and poor drainage which need to be addressed. As a temporary structure, the Pavilion did not need to be designed to withstand extreme temperatures, long term use, or support the cost of maintenance. If preserved, the restoration would need to address the structural problems of the pavilion, financial feasibility, protection, conservation on the floor, and the accumulation of forty years of neglect.

Public access to the site is also a concern due to its remote location and the need to attract an audience. While the World's Fair ground may be convenient for visitors coming from Queens, it is out of the way for people visiting from other boroughs. The Fair grounds are a destination rather than a detour on the way to other sites, and visitation to the New York State Pavilion is likely to be a large concern. Even if a roof were reinstalled, the Pavilion is an open air site which would limit visitation to more temperate months.

### *3.10.2 Presentation ex situ*

While the floor was part of the design for the New York State Pavilion and remains within the structure, it is a separate element that could be removed and housed elsewhere. If moved, the pavement would no longer be dependant on the decisions made

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<sup>43</sup> See: Susan Singh, "Complexities in Conservation of a Temporary Post-War Structure: The Case of Philip Johnson's New York State Pavilion At the 1964-65 World's Fair", (master's thesis, University of Pennsylvania, 2004)

regarding the future of the Pavilion and would allow conservation work to proceed at its own schedule, focused on meeting its needs exclusively. Some of the difficulties and considerations of preserving the pavement in situ could be remedied by moving the map to a controlled environment where the floor would not be subjected to weather and changing temperatures, thus reducing the risk of further deterioration.

Relocating the pavement may address some of the issues with public accessibility as well. Placing the pavement in a highly visible and accessible location would allow a wider audience to see the terrazzo pavement and be aware of the history of the map, its unique features and construction. Higher visibility would present an opportunity to make the public more aware of terrazzo as an artistic medium and the importance of its conservation and treatment.

However, finding a place to put the map would be the greatest challenge. At 9,072 square feet, there are few centrally located venues that could accommodate the pavement. If a location was available, the presentation would have to communicate the history and context of the pavement and explain why it was moved from its site. The risk in moving the pavement would be the severed experience of the relationship between the Pavilion structure and the pavement and the loss of a context to provide significance.

While the situation may not be ideal, the separation of the pavement from the Pavilion should be considered if the future of the site remains uncertain for the foreseeable future. While the Pavilion provides an important context for the pavement, and vice versa, is the union important enough to risk losing the pavement altogether, by

simply doing nothing? The Pavilion structure will likely survive longer than the pavement if they continue to be left untouched. If this is the case, it may be a better option to move the tiles, so as not to lose them entirely and compromise the entire site. Certainly, finding an appropriate venue and the funds to undertake such a project are crucial and potentially unrealistic, but if the site's future remains undecided for long, the effects of deterioration will not leave much of anything to be preserved.

### 3.11 A Functioning Floor versus an Object

Whether the floor remains in situ or moves to another location, there are conservation and presentation issues that will have to address the visual and experiential impact of an intervention. Options regarding both aspects of the pavement's preservation include preserving the pavement as a functioning floor and preserving it as an object. Both intervention options will be explored in terms of their objectives, what may physically be involved in their treatment, the impact each will have on how the pavement is experienced, and how the age and level of decay of the floor may affect the public's perception.

#### *3.11.1 The Pavement as a Functioning Floor*

One of the great attractions for visitors to the fair was to walk the length of New York State, looking for places they recognized, following roadways and seeing the city of New York and Queens, highlighted with an arrow indicating where they are. "You can walk over the terrazzo map; 'explore' highways and byways of the Empire State.",

advertised a pamphlet from the Fair.<sup>44</sup> Even decades later, in a state of disrepair, visitors to the Pavilion still meandered across the pavement looking down at the place names and roadways of the State.<sup>45</sup> The map is so large that the only way to see all of the details and places identified is by walking over the entire pavement and seeing it up-close.

Conserving the pavement with the goal of allowing visitors to walk on the map, maintains the original use, function and experience associated with the pavement and provides the visitors the opportunity to view the details up close. The pavement was made to be walked on, not viewed from far away or behind a barrier.

However, in order to protect the floor from foot traffic and make it safe for people to walk on, the conservation and repair of the map would be aggressive in terms of the physical intervention on the original material of the map and the visual transformation that would take place.

If the goal is to preserve the map as a functioning floor, the way it was originally, the conservation treatment and approach has to follow the terrazzo industry's method of regrinding and finishing the floor to protect it from foot traffic. The process, as specified by The National Terrazzo and Mosaic Association entails wet grinding the soiled surface away, by machine or by hand, to reveal the color below, grouting voids with pigmented grout, allowing the grout to cure for 72 hours, additional fine grinding to remove excess grout, cleaning the surface with a neutral cleaner followed by water, and finally

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<sup>44</sup> Bill Young, "Legacy of the New York State Pavilion." <http://nywf64.com>

<sup>45</sup> Christopher Grey, "A Windswept, Gaudy Ghost in Search of a New Role" *The New York Times*, April 22, 1990, pp.R12.

protecting the surface with a sealer.<sup>46</sup> In many cases, the terrazzo tiles have deformed, creating depressions within the 4'x4' squares which would require stabilization and a new support for the tiles before the surface could be ground.

The visual impact of an intervention like this would alter the muted colors and rough surface texture of the presently aged floor and replace it with a slick, shiny surface, reminiscent of a newer version of itself. While this method is the standard approach to restoration in the terrazzo industry, it does not consider the experiential or ethical impact of altering the original fabric and erasing or muffling the effect and the role that time and neglect have had on the floor we see today. As part of the story of the floor, the progression into ruin has a longer history than the floor in its prime, during the two years of the World's Fair. However, it is worth exploring the other option for display before determining whether this method is appropriate or not.

### *3.11.2 The Pavement as an Object*

While the terrazzo pavement was created as a functioning floor, it has since deteriorated to such a state that sections of the map have undulating surfaces and missing or partially missing tiles that make for an uneven walking surface and a very fragile floor. Protection, both for the pavement material and for pedestrians is a big concern when considering whether or not to allow people to walk on the floor. The option of not allowing visitors to walk on the floor should be explored for the reasons listed above and

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<sup>46</sup> The National Terrazzo and Mosaic Association. "Restoration of Terrazzo Finish", [http://www.ntma.com/specifications/cementitous/restoration\\_terrazzo\\_finish.pdf](http://www.ntma.com/specifications/cementitous/restoration_terrazzo_finish.pdf)

for the impact that conservation interventions may have on the existing fabric and the experience of seeing the map.

If the floor is to be preserved as an object to be viewed, rather than walked on, the level of intervention to stabilize and protect it would not have to be nearly as severe and visually altering as the terrazzo restoration approach. As a functioning floor, the pavement would have to be level, so that it was safe to walk on and would have to be sealed to protect it from foot traffic and from moisture absorption. As an object, the only actual requirement is that the floor be stabilized and presented for viewing. Presentation is no small requirement however, and the conservation approach would need to consider the impact that it would have on the visual reception by an audience.

Viewing distance is a major factor in making decisions about how to conserve and display the pavement as an object. The location of the pavement would likely determine where an audience could stand and how close they could get. If the pavement were to remain in situ the balcony surrounding the pavement could be used as a viewing platform to observe the overall configuration of the map but the balcony is too high and the map is too large for the viewer to see the details up-close or even take the entire map in all at once.

The other option which would be feasible in situ and ex situ would be to rope off the pavement surrounding the state of New York and allow visitors to walk on the plain grey terrazzo tiles around the perimeter of the state. These options would have the least impact on the pavement and allow the visitors to see the map up close. However,

restricting access to the map would remove the interactive experience that made the pavement so popular during the Fair and would potentially draw visitors to the site in the present.

### 3.12 Multiple Intervention Levels

Another option would be to restrict areas of the map that were particularly fragile and allow people to walk across the sections that have not suffered as much damage. This would satisfy the impulse to walk across the largest map in the world while drawing particular attention to the tiles that are restricted. New York City is in particularly poor condition on the map and would likely be a popular location for visitors, as it was during the Fair. As an area of interest, the conservation of a heavily damaged and symbolically significant portion of the map presents challenging conservation issues, similar to some of the problems faced in the terrazzo and mosaic case studies. How to compensate for loss, whether to replace, what materials to use and the discernability of a repair are all questions that need to be answered prior to any intervention. While there are varying levels of loss present on the pavement, total loss of the terrazzo and plastic symbols, compromises the original design and integrity of the map. New York City provides a good example of a section of the map which is highly recognizable, even in its current state of decay, yet the degree of loss, leaves many questions unanswered about what was included in the original map and how to reintegrate this important section with the rest of the map.



### 3.12.1 *Lacunae*

Predictability is a major factor in determining whether or not it is appropriate to recreate lost imagery. In mosaic conservation, patterns are replicated when their original configuration can be predicted. In all three terrazzo case studies where loss was an issue, the original pattern or design was either known or was part of an obvious repeat. The terrazzo of the New York State Pavilion was based on a Texaco Road map depicting the State of New York. A 1959 and 1960 road map were acquired and compared to the photomontage of the Long Island section. While there are some discrepancies, in which a land mass or curvature was simplified in the terrazzo, the basic configuration of the pavement map, is very similar to the Texaco road map from 1960. (Appendix B and C). While liberties were clearly taken in the translation from map to terrazzo, the Texaco map could be used as a template for an interpretive recreation of the missing sections. The plastic insets represent words and symbols that are still in tact on much of the map and could be used as templates to create new letters and symbols of the same size, color and material. The plastics and the components of the terrazzo mixture were identified by Amel Chabbi in 2004 and compatible materials could be found to match the original colors, proportions and size of the marble chips and binder.<sup>47</sup>

### 3.12.2 *Visual Impact of an Intervention*

Just as the viewing distance is a major factor in how visitors will experience the pavement, the age or newness factor of conserving the pavement will have an equal effect

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<sup>47</sup> See: Amel Chabbi, "Restoring a 20<sup>th</sup> Century Terrazzo Pavement: A Conservation Study of the Floor Map of the New York State Pavilion, Queens, New York", (master's thesis, University of Pennsylvania, 2004)

on how it is perceived. Although the pavement was designed to be temporary and has survived longer than intended, the damage it has suffered far surpasses the damage that most terrazzo floors from the 1960's have suffered but the public's perception of age and how something is expected to look after 40 years is an important consideration for conservation efforts. Not only is expectation important, but what the public is willing to accept as signs of age is crucial to making choices about the visual aspect of the pavements preservation.

The conservation and presentation approach taken by mosaics conservators to ancient floor mosaics, address many of the issues that confront this pavement, such as preserving original fabric, reintegrating loss, the viewing distance, and referencing the original design, while acknowledging what remains. However, they do not provide repair techniques and materials that can necessarily be translated directly to terrazzo.

Terrazzo is an appealing construction material for its versatility of design, color, and texture. Conservation treatments must reference the material that they are aiming to repair in terms of compatibility of materials, but also in terms of appearance, respect for the existing material and the design intent. The treatments made to the terrazzo floors in the terrazzo case studies all aimed to minimize the appearance of repairs and damage but for different reasons. The Hollywood walk of Fame case study was exclusively concerned with replacement and the appearance of new terrazzo, even if it meant standing in for an original Hollywood star. The conservation and restoration of the floor in the East Columbia Building in Los Angeles and St. Joseph's Public Library in

Missouri, wanted to detract attention from the damage inflicted on the floor, and shift it to the overall design of the terrazzo by matching the binder, aggregate and surface finish.

Terrazzo is often selected for its durability and the numerous color and design options it provides and the pavement of the New York State Pavilion is no exception. There are few other flooring materials that could have been translated into a gigantic road map with the level of detail that was achieved. The colors for the plastic and the terrazzo are a highly significant part of the original design and significant for their cartographic meaning. Each symbol, representing town population, a highway number, or other markers frequently seen on road maps, is color coded and linked to a key. The colored terrazzo also represents features of the map such as bodies of water in blue terrazzo, parks in green, roadways in red and black, and yellow terrazzo for the city limits of New York City. While these colors are still apparent, they are faded and dirty from constant exposure, only hinting at the vibrancy that they once had. Broken pieces of terrazzo on the site, reveal the bold colors of the marble chips, contained beneath the soiled surface.

### 3.13 Conclusion

The degree of deterioration that the floor has experienced over the past 40 years ranges from surface cracks to a complete loss of material, resulting in a floor that requires different levels of attention and consideration. While time is a large part of the history of the pavement and there is an appeal to ruins, there is a resiliency to terrazzo that is an important part of the material and its presentation. The unique design, construction, and significance of this pavement can best be presented in a twofold manner that

acknowledges the character of terrazzo as a material and the effect that time and neglect have had. A conservation approach that uses traditional construction and repair techniques is important for compatibility of the materials and to fulfill the expectation of terrazzo as a durable and versatile material. The contrast between the tiles that survive and those that are lost makes reaching a solution difficult due to the extreme variation in condition and the need for treatments to treat the range of problems and to unify the map. While repair of terrazzo floors has been around as long as the tradition of making them, the relative youth of the terrazzo industry in the 20<sup>th</sup> Century in this country, means that the literature and ethical and philosophical question that should accompany the treatments, are several steps behind.

The current research by the GSA and NCPTT into vitrification could provide a possible alternative to the extreme process of grinding the surface to reveal the original color provided it can be proven to be successful in its performance and allow future re-treatment. A balance must be achieved between restoring the pavement as a sleek and refurbished version of its original self and preservation of the pavement as a stabilized ruin. A two part approach to preserving the pavement as a partially functioning floor could satisfy the expectation that terrazzo be a functioning, durable and aesthetically versatile material, while acknowledging the loss of significant portions by selective replacement or compensation through images, such as the original Texaco paper map in different materials.

## CHAPTER 4: CONDITIONS ASSESSMENT

In addition to considering the presentation and ultimate display of the New York State Pavilion pavement, understanding what caused the deterioration is essential to making decisions regarding intervention and ultimately treatment and maintenance.

This chapter will address the present conditions affecting the map and their deterioration mechanisms, in relation to the current site context and the past history of the site including environment, construction, manufacture, installation, maintenance and repair. It will also discuss the findings of the conditions assessment surveys, concentrating on the patterns of conditions that are observed and quantified with an emphasis on how they manifest themselves and their relationships to each other.

### 4.1 Pavilion history since the fair

The New York State Pavilion, like the other fair pavilions, was not designed to be a permanent structure. While it received praise for its eccentric design during and after the fair, the exorbitant cost of demolition was ultimately what saved the pavilion from being torn down. The question of what to do with the site was a concern then and now. In the 1960's it was used for art exhibits and occasional concerts, and between 1970 and 1974, it was used as a roller rink.<sup>48</sup> The floor was coated with plastic during its roller rink years and the pavilion was regularly maintained and patrolled. After 1974 when the rink closed, the pavilion sat empty and by 1977, the roof panels were removed for safety

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<sup>48</sup> Bill Young. <http://www.nyc-architecture.com/BKN/BKN003.htm>

reasons and the floor has been exposed to the elements ever since.<sup>49</sup> While maintenance ceased, the pavilion remained open to the public till at least 1990 and people were free to enter and walk on the map. “Transferred to New York City after the fair and still officially open, the pavilion attracts occasional visitors, who quietly pace out distances on the mosaic map.”<sup>50</sup> By 1990, sections of the map were crumbling but Manhattan was still intact, while today, it is entirely missing, probably the result of souvenir theft.<sup>51</sup> Standing water, plant growth, and bird guano have been a presence since the floors exposure.

The history of events in the life of the pavilion is critical to understanding the present conditions affecting the map and future concerns and considerations.

#### 4.2 Construction & Installation

The unique construction and installation of the pavement are important factors in understanding the deterioration process. Deterioration is a function of the manufacture and also exposes the way the panels were put together. It is worth comparing traditional and frequently used methods of terrazzo manufacture as a comparison to the New York State Pavilion pavement. The differences between this pavement and other terrazzo floors may bring to light some of the construction choices that were made and how they contributed to the particular kind of deterioration that is evident in the New York State Pavilion.

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<sup>49</sup> Ibid.

<sup>50</sup> Christopher, Grey “A Windswept, Gaudy Ghost in Search of a New Role”, *New York Times*, April 22, 1990, pp.R12

<sup>51</sup> Ibid.

### 4.3 Sand Cushion Terrazzo Installation

There are various types of terrazzo installation which are divided into two major categories, bonded and unbonded. In bonded systems, the topping and underbed are adhered to the sub floor and in unbonded systems, the topping and underbed float on a sand bed that separates and topping and underbed from the sub floor<sup>52</sup>. Bonded installations are divided into four categories including thin set, bonded underbed, monolithic and chemically bonded, while unbonded methods are simply called Floating or Sand Cushion.

The sand cushion method of terrazzo installation separates the terrazzo topping and underbed from the structural slab, with a layer of sand to absorb any movement.<sup>53</sup> According to The National Tile and Terrazzo Association, the minimum thickness for a sand cushioned installation is 2 ½” but is commonly installed with at least a 3” thickness. The requirement includes a minimum ½” but more typically a 5/8” thick terrazzo topping, on a 1 7/8” thick reinforced underbed. The underbed typically contains wire mesh reinforcement and sits on an isolating, waterproof membrane placed on top of the sand layer, overlapping by at least 4 inches.<sup>54</sup> Divider strips are set in the underbed before the terrazzo topping is poured at a maximum distance of 6’, and the terrazzo is leveled to

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<sup>52</sup> Harold B. Olin, John L. Schmidt and Walter H. Lewis. “Terrazzo” in *Construction Principles, Materials and Methods*. (New York: Van Nostrand Reinhold, 1995), pp. 763

<sup>53</sup> Walter C. Johnson. “Terrazzo” in *Twentieth- Century Building Materials: History and Conservation*, (Ed. Thomas C. Jester: New York, McGraw Hill, 1995), pp. 238.

<sup>54</sup> Harold B. Olin, John L. Schmidt, Walter H. Lewis. “Terrazzo” in *Construction Principles, Materials and Methods*. 6<sup>th</sup> Edition. (New York: Van Nostrand Reinhold, 1995), pp.764

the height of the strip.<sup>55</sup> The unbonded, or sand cushion method is has the advantage of the a layer of sand which absorbs movement in the structural slab and is generally less susceptible to cracking than the other terrazzo systems.<sup>56</sup>

#### 4.4 New York State Pavilion Terrazzo

The terrazzo that was made for the New York State Pavilion is a unique method of construction, due to the individual terrazzo tiles that were constructed and installed one by one. Of the standard terrazzo systems described above, this pavement bears the closest resemblance to the unbonded method due to the separation from the concrete slab that the tiles sit on.

Each tile is 2” thick and consist of a 5/8” terrazzo topping, bonded to a 5/8” cementitious underbed, which sit on a piece of plywood which has been bolted to a steel frame that supports and edges the terrazzo tile. The measurements were taken from the tile that was removed in 2004 for Amel Chabbi’s thesis. The plywood has partially rotted and an exact measurement of the original thickness was difficult to ascertain. However, the three layers, the topping, underbed and plywood are contained within the metal frame and the measurement from the bottom of the frame to the terrazzo surface measures 2”. The plywood was likely ½” to 5/8” thick. The “L” shaped metal frame conceals the underbed and plywood base on all four sides, and hold the plywood on the bottom. The “L” shaped metal frame measure 1” x 1” x 1/8” in thickness, and supports the bottom and sides of the tile. The tiles rest on a concrete slab that was poured during the Pavilion’s

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<sup>55</sup> Ibid., 765

<sup>56</sup> Ibid., 763



construction. Underneath the “L” shaped metal frame, on the bottom of all the tiles, are protruding metal locks measuring 1” x ½” x 1/8”, and corresponding grooves in neighboring tiles that are designed to link the tiles together with tongues and grooves.<sup>57</sup>

This unique method of terrazzo construction and installation was discovered during the removal of a tile for Amel Chabbi’s thesis in 2004. The Tile had to be removed by pulling the tile out on a diagonal due to the interlocking tongues and grooves.

The terrazzo from the New York State Pavilion has an aggregate/paste ratio of 70%/30% in the plain terrazzo and 60%/40% in the map terrazzo, while the blue and red tinted terrazzo contains glass aggregate. Rebar is included in the underbed for reinforcement and the plastic insets are held in place by zinc strips and a network of concealed metal and plastic supports.

#### 4.5 Conditions and Contributing Factors

Deterioration mechanisms of building materials can be a result of their composition, manufacture, installation, and environment. The terrazzo floor map of the New York State Pavilion has undergone significant changes since its inception and its deterioration is likely a combination of all the factors listed above. Working in conjunction and individually, the current conditions reflect the intrinsic and extrinsic factors that determine their behavior. Beginning with a symptomatic description and assessment of existing conditions offers a useful starting point for understanding and

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<sup>57</sup> Amel Chabbi. *Restoring a 20<sup>th</sup> Century Terrazzo Pavement: A Conservation Study of the Floor Map of the New York State Pavilion Queens, New York*. (master’s thesis, University of Pennsylvania, 2004), 10

ranking the specific mechanisms that have contributed to the deterioration of the floor map.

#### 4.6 Conditions

The individual tile conditions that will be discussed and analyzed include loss, cracking, deformation, incipient spall, and fill. Each condition will be defined by the parameters of this survey and how they manifest themselves on the pavement, followed by a discussion of potential contributing factors. While the conditions identified for this survey were limited to observations based on the 40 tiles that make up Long Island, they are present on the entire pavement and represent the major existing conditions. A conditions glossary was created as a reference while the hand drawn survey was being completed on site. (Appendix D). The definitions of each condition will follow, and expand on the descriptions in the conditions glossary, explaining how and why they are being defined for the purposes of this survey.

##### *4.6.1 Loss*

The most severe condition present on the terrazzo pavement is the total loss of original material. Loss is visible in varying degrees on this floor, including the absence of the terrazzo topping down to the underbed, the absence of the underbed, partial loss of the terrazzo topping, missing plastic insets, and the presence of cement fill in place of missing original fabric. Although fill is an indication of loss of material, it is identified as a separate condition in this survey, because it is an addition to the pavement.

Although various levels of loss are present on the pavement, the survey of Long Island is limited to addressing total loss of the terrazzo, plastic, and underbed. Total loss of fabric is the last step in the sequence of most subtractive conditions and this survey is concerned with the broader categories of conditions affecting Long Island due to the quantity of tiles being surveyed.

#### *4.6.2 Fill*

The cement fills are an addition to the pavement by the New York City Department of Parks and Recreation, to fill in the tiles that were partially or totally missing their original material.<sup>58</sup> The cement fills are indicators of previous loss and areas that were either damaged earlier, or areas that may have deteriorated at a faster rate.

#### *4.6.3 Deformation*

Deformation is visible at the edges of the tiles where the metal frames may either appear warped or form a ridge due to the uplift of the edges and or depression of the terrazzo surface in the center of the tiles. Deformation is sometimes visible on all four sides of a tile, and sometimes only on one side. It is specifically identified, not by the metal frame, but by the area 2-4 inches from the frame, within the terrazzo tile.

Deformation of the tiles appears to be related to at least two phenomena: oxide jacking from the corrosion of the steel frames and the loss of support provided by the plywood due to rotting. Poor compaction of the sub grade surface during initial

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<sup>58</sup> Amel Chabbi. *Restoring a 20<sup>th</sup> Century Terrazzo Pavement: A Conservation Study of the Floor Map of the New York State Pavilion Queens, New York*. (master's thesis, University of Pennsylvania, 2004),28

construction while a common factor, does not appear to be prevalent here as indicated by the sound and level sand and cement beds disclosed by recent tile removal.

#### *4.6.4 Incipient Spall*

Incipient spall is a term that refers to terrazzo that has not yet fully detached from the substrate. It is characterized by terrazzo fragments that appear to be loose or crumbling but is in fact still attached to the tile. A spall is defined as loose material that is not connected to a surface and incipient is a term refers to the beginning or early stages of a condition. For this survey, incipient spall refers to terrazzo that is still attached to the substrate but is close to becoming detached. Incipient spall is often seen in conjunction with severe map cracking and in proximity to total loss.

#### *4.6.5 Parallel Cracking*

Parallel cracking is defined by this survey as cracks that appear as single line fractures occurring at an equal distance apart from one another, running in the same direction. Parallel cracks are mostly visible in the plain grey terrazzo but are present in several of the Long Island tiles that are not heavily divided by the plastic insets and map imagery. The parallel cracks indicate the location of the rebar below and the different orientation of the tiles as they were installed.

#### *4.6.7 Network Cracking*

The other form of cracking present is network cracking which is defined by a pattern of connected cracks forming in all directions and visible on the surface. Due to the prevalence of cracking on the entire pavement and the various levels of deterioration,

network cracking has been identified by three levels of severity, minor network cracking, moderate network cracking, and severe network cracking.

Minor network cracking is limited to the terrazzo surface and does not contribute to the deformation of the panel. Moderate network cracking penetrates the terrazzo topping but the integrity of the surface and the imagery remain in tact. Severe network cracking fully penetrates the terrazzo topping and the terrazzo often appears as “islands” of terrazzo, frequently seen in conjunction with deformation of a tile.

#### 4.7 Contributing Factors

There are various kinds of deterioration mechanisms both internal and external that can impact the way a material ages and responds to changing conditions. External factors such as the environment, include weather and temperature, site conditions, and the degree of maintenance, use, and vandalism from human presence on the site. Internal factors include material composition, manufacture and installation. While all of these elements contribute to decay, the intent of the Pavilion to be a temporary structure set in motion, all of the other decisions and design specifications that resulted in the combination of factors that led to the kind of deterioration present on the New York State Pavilion pavement.

The various factors that contribute to deterioration of the terrazzo pavement will be discussed in conjunction with the conditions that they may be causing and how they manifest themselves on the pavement.

*4.7.1 Site*

The New York State Pavilion was always an open air pavilion with a tented roof and an open oculus at the top which would have protected most of the map from direct contact with rain water but not from changing temperatures. The dismantling of the roof in the mid 1970's left the floor completely exposed to the elements.<sup>59</sup> While previously, the oculus would have allowed rain water to enter, drainage would not have been installed to accommodate the amount of water that was subsequently free to enter the pavilion after the roof was removed. The pitch of the floor may also contribute to the inability of the floor to shed water appropriately. The predominant presence of plants on the eastern portions of New York State as of October 2006, indicates areas that are protected from sunlight which would slow down the drying process, allowing plants to thrive. During the October visit, the drain which is located in the North Eastern portion of the State, was clogged, and the eastern portion of the map had standing water present.

The site that the pavilion stands on was previously a salt marsh that was used as the Corona trash dump before being used as the site of the 1939-40 World's Fair. Built as a temporary structure, the sub grade conditions would not have required the same treatment as a long term structure would have. Settlement of the sub grade surface can result in disruption of a hard surface such as concrete or terrazzo and can occur for several reasons, one of which is poor compaction of the sub grade surface during initial

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<sup>59</sup> Iwen Hsiao. "Skating Under the Stars? Closer Roller Rink May go Roofless" *Long Island Post*, July 24, 1974.

construction.<sup>60</sup> Deformation of the tiles may be partially due to the condition of the slabs below.

There is also a possibility that the concrete slab is not perfectly flat and could be prone to a slightly irregular surface that results in ponding of water, should it have the ability to enter. The scale of the sub-floor is so large that it is highly probably that there are some imperfections in the surface. After a rain storm, water could become trapped between the sub-floor and the tiles in areas that are slightly depressed, leaving standing water beneath certain tiles. With no where to drain, the water could either seep out through cracks in the sub-floor, or escape through evaporation, up through the tiles.

#### 4.7.2 Vegetation

The poor drainage and accessibility of rain water to enter and remain on the pavement provides good conditions for plants to thrive. In some cases the remaining debris from decomposing plants or debris that had blown into the Pavilion, provided a protective covering for the terrazzo but where the roots of the plants had taken hold, the terrazzo was heavily damaged. The root systems in some cases caused the terrazzo to heave upwards, partially resulting in incipient spalls and deformation of the surface.

#### 4.7.3 Freeze/Thaw

Extreme temperature changes and the freeze-thaw cycle are a major factor in the deterioration of the terrazzo pavement. Exposure to low temperatures can cause water in

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<sup>60</sup> Philip H. Perkins, *Repair, Protection and Waterproofing of Concrete Structures*. (London: Elsevier Applied Science Publishers, 1973), pp. 137

the cement pores to expand by 9% in volume displacing excess water and forming ice bodies in the capillary pores.<sup>61</sup> The expansion caused by freezing water in the pores can result in damage to the material in the form of surface spalling and crack formation as the material is forced apart. The repeated process has a cumulative effect that weakens the material and provides additional entry points for moisture, leading to further cracking and deterioration.<sup>62</sup> Porosity and saturation point are determining factors in the rate and severity of the damage caused by the freeze-thaw process. The climate in New York City can fall below freezing the winter months and the continual saturation from rain and standing water combined with freezing temperatures over a 40 year period has contributed to the deterioration of the terrazzo pavement. Some of the cracking present is likely due to the effects of the freeze-thaw process and the moisture infiltration on the pavement over 40 years of the repeated cycling.

#### *4.7.4 Use, Maintenance and Vandalism*

Damage to the terrazzo pavement is a result of neglect as well as negative impact. After the Fair, the Pavilion was used as a roller skating rink for three years and the pavement was covered by a plastic coating to protect the surface from the roller skates. After the roller rink was closed, maintenance was limited to the addition of concrete to fill in the areas of the pavement that had been damaged and lost. The Pavilion remained open up until the early 1990's when people were seen wandering in and out of the

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<sup>61</sup> Philip H. Perkins, *Repair, Protection and Waterproofing of Concrete Structures*. (London: Elsevier Applied Science Publishers, 1973), pp. 137

<sup>62</sup> A.M. Neville, *Properties of Concrete*, (New York: John Wiley & Sons Inc., 1981), pp.405



Pavilion.<sup>63</sup> (Figure 13). Souvenir theft of pieces of the pavement was known to occur.<sup>64</sup> The New York City section of Long Island has suffered tremendous loss and has been partially filled in with patches of concrete. As the location of the Pavilion, it seems likely that this portion of the map may have been a popular target for people seeking souvenirs of plastic letters from their hometown. Currently, the Pavilion is closed to the public but is used by the Queens Theater to store props for their shows.

#### 4.7.5 Materials, Manufacture and Installation

The construction of the terrazzo tiles is a reflection of the temporary design life of the pavilion and do not conform to a specific method of terrazzo installation. The construction is similar to the unbonded method due to the separation of the tiles from the structural concrete slab that they rest on. However, the tiles are only 2” thick as opposed to a minimum of 2 ½” as specified by the National Terrazzo and Mosaic Association, and include a piece of plywood separating the underbed and topping from the structural slab. The terrazzo topping is a standard thickness at 5/8” but the underbed is only 5/8” as opposed to the typical 1 7/8” commonly seen in the sand cushion method. The plywood below the underbed is approximately 5/8”, making the thickness of each tile 2”, including the 1/8” thick metal frame. The plywood appears to be a support mechanism for the topping and underbed. Unlike typical unbonded installation, there is no evidence of a waterproofing membrane that would have kept moisture from rising up through the floor. The rotting plywood which is visible in the panel that was removed from the site in 2004 and in some

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<sup>63</sup> Christopher Grey. “A Windswept, Gaudy Ghost in Search of a New Role”, *New York Times*, April 22, 1990, pp.R12

<sup>64</sup> Bill Young, <http://www.nyc-architecture.com/BKN/BKN003.htm>

of the severely deteriorated tiles on the site, where it has been exposed, is a function of the temporary nature of the pavement, which would never have been chosen if long term durability was an issue. (Figure 14 and 15).

The plywood and other additions to the terrazzo such as the rebar and the plastic insets, are features that determine the kind of deterioration that is present on the pavement and reveal aspects of the construction that are not visible in the well preserved tiles. The addition of plywood was revealed when one tile was removed in 2004 and is also visible where severe deterioration has left it exposed . How the plywood has contributed to deterioration is an important question. The plywood is supported within the tile by a 1” metal frame holding it from below. As the buffer between the topping, underbed, and the concrete slab, the plywood is an important structural member whose strength is key to the strength of the layers above it. While external grade plywood may have been used, 40 years of exposure to rain and moisture has clearly pushed the limit of the plywood’s durability. The deformation that is seen in the depressions in the center of many of the tiles, is likely caused by the plywood rotting and failing as a support for the topping and underbed.

The terrazzo underbed was reinforced with metal rebar, which is especially evident in the plain grey terrazzo which displays evenly spaced parallel cracks but less evident in the map terrazzo which is divided by plastic insets and colored terrazzo. (Figure 16). The plastic insets and colored terrazzo delineate the roads and place names of the map. The insets form a network of supports below the surface that hold the plastic

in place and provide designated areas for the different colored terrazzo. The insets prevent the parallel cracking of the rebar from revealing itself. Instead, networks of crack form within the terrazzo sections between the insets, rather than allowing a continuous crack to extend the length of the tile.

#### 4.7.5 Moisture and Permeability

Cement is a major component of any terrazzo and concrete mixture and the deterioration mechanisms that affect concrete are an important comparison when considering durability and susceptibility of terrazzo. Concrete is the mixture of cement and either sand or gravel, while terrazzo is comprised of cement and most frequently marble chips as an aggregate. The cement binder in both materials is more susceptible to deterioration than the aggregate, due to the permeability of Portland cement. The presence of rebar in the manufacture of the terrazzo panels plays a crucial role in the deterioration process and as a material that is frequently used to reinforce concrete, there are common causes and effects of steel and concrete deterioration.

There are several causes or sources of corrosion of rebar in concrete and the most serious determining factors are the presence of moisture and permeability of the material. “The primary causes of steel corrosion are inadequate cover to steel, carbonation, neutralization due to atmospheric pollutants, and/or chloride penetration.”<sup>65</sup> Carbonation is one of the most prevalent problems associated with reinforced concrete and one that is hard to avoid altogether. Concrete has a high alkalinity by nature and this environment

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<sup>65</sup> R.N. Swamy, “Durability of Rebars in Concrete”, in *Durability of Concrete G.M. Idorn International Symposium*. (Detroit: American Concrete Institute, 1992), pp. 67

provides protection to embedded steel, helping it to remain chemically passive.<sup>66</sup> Rebar corrosion occurs when the cement cover is insufficient and/or highly permeable, thus allowing moisture and carbon dioxide to enter and lower the alkalinity of the binder which counteracts the passivity of the metal.<sup>67</sup> . When the concrete surrounding the steel is carbonated, the steel will begin to rust and the rust will expand up to ten times the size in volume of the original steel bar. The rust expansion creates cracks and spalling in the brittle concrete.<sup>68</sup> Permeability of the concrete and the presence of moisture it seems, are the catalysts in this chain reaction

The terrazzo pavement likely reacts in a similar manner to concrete that is affected by rebar corrosion. Oxygen, permeability of the material, and moisture being necessary conditions for a reaction to take place. The unprotected pavement has been subjected to moisture in the form of standing water and driving rain for over 40 years. The parallel cracking visible in the terrazzo is likely due to the volumetric expansion of the rusting rebar which forces the terrazzo topping to accommodate the shift below by cracking. The network cracking may also be related to the rusting rebar but manifests itself in a pattern of cracks that reflect the construction of the insets.

#### 4.6.1 Tile Location

While the seven conditions are identified separately, they are likely forming in conjunction with one another, or as a result of one another. The contributing factors

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<sup>66</sup> Ibid., 68

<sup>67</sup> Jimi Fadayomi, "The Deterioration of Reinforced Concrete: An Introduction", in *Preserving Post War Heritage: The Care and Conservation of Mid-Twentieth-Century Architecture*, (Shaftesbury, UK: Donhead Publishing, 2001), pp.107.

<sup>68</sup> Ibid.,109

enable deterioration of the tiles to begin and time and neglect exacerbate the process. The combination of factors, environmental, manufacture, use, maintenance, composition, and design intent, have contributed collectively, but the level of deterioration of the tiles varies significantly. Some tiles have almost completely deteriorated, while others are fully in tact. The next phase of the conditions assessment will examine the overall condition of the pavement and take a closer look at how the seven conditions appear on the representative tiles from Long Island.

**CHAPTER 5: TRENDS AND PATTERNS OF EXISTING CONDITIONS**

In addition to identifying the major conditions affecting the pavement of the New York State Pavilion, an overall survey was completed and correlated to a detailed survey of tiles from Long Island to examine the patterns, distribution and location of conditions on the pavement as a whole and on a representative section of the map. The use of a broad survey, in conjunction with a detailed survey on a smaller scale was intended to provide a methodological approach to inform future treatment decisions based on severity of the conditions on a small scale and prevalence on a large scale.

**5.1 Methodology**

The focus of this conditions survey is on the 40 tiles that make up Long Island and their context within the 567 tiles of the map. An overall survey of the entire pavement was conducted, followed by a more detailed survey of each tile within Long Island. The goal of the overall survey was to rank each tile on a scale of 1 to 10, with 1 representing the worst possible condition and 10 representing the best. By giving a value to each tile, and a color to each value, the locations of tiles in good, poor and intermediate condition levels can be identified as well as areas with high or low concentrations of each. The initial survey was done by hand and then transferred into Arc View (ArcGIS) for quantification. For identification, each tile was given a unique alpha-numeral. The objective was to be able to quantify and identify patterns and trends of deterioration based on location.

The conditions survey of Long Island was intended to provide a preliminary assessment of the current conditions present within the 40 tiles. A total of seven conditions were identified in a hand survey which was digitized in AutoCAD and like the overall survey, was transferred into Arc View (ArcGIS) for analysis and quantification of the conditions. Both the overall survey and the Long Island survey will compliment each other by providing insight into how the current conditions are affecting the entire map and how they manifest themselves in a tile.

## 5.2 Overall Assessment

Two site visits were made in October and November, 2006 and were dedicated to clearing the pavement of vegetation and sweeping each tile to collect and bag loose material. (Figure 17). Each tile was given an alpha numeral for identification and each bag that contained material from a tile was labeled as well. The numerical values assigned to each tile, ranging from 0-10, worst condition to best condition, were based on an overall assessment of the tile condition, not on multiple factors averaged into one number. However, the single number attributed to each tile did consider the degree of cracking, deformation, and presence or lack of original material. As the major factor determining the integrity of the terrazzo pavement, loss of material is directly related to the overall values addressed. A high value reflects a low percentage or area of loss, and a higher integrity and quantity of original fabric. (Appendix C, Map 1).

The distance between the tiles that make up New York State and the circular wall surrounding the pavement has not yet been determined. The placement of New York

State within a grid of tiles is intended to provide context but is not representative of the number of tiles surrounding New York State. The orientation of the map will be referred to by its placement within the site, not by the orientation of New York State, as it would be read on a roadmap. A north arrow is included on every map to indicate the placement of the state within the site.

On the 0-10 scale, there were no tiles that were given a value of 10 but every other number is represented on the survey. A value of 0, indicates a tile that has been completely replaced by cement. The value that represents the largest percentage on the pavement is a value of 6, at 24%. The area was calculated based on the area of all 567 tiles, and the percentages are based on a value of 100%. The percentages for the remaining tiles are in descending order as follows: 7=22%, 5=13%, 4 and 8 =10%, 3=6%, 2=5%, 1 and 9=4% and the complete replacements where concrete has filled in an entire tile makes of 3% of New York State.

While these numbers address the quantities of each value on the pavement, by breaking the values into categories of three, it is easier to understand and visualize the degree and the locations of areas that are in good, poor and intermediate condition. The survey reflects the level of integrity of the tiles and the approximate percentage of loss that they display. (Appendix C, Map1). Tiles given a value of 6-9 display a range of approximately 0-10% loss, tiles with a value of 3-5 display approximately 10-30% loss, and tiles with a value of 0-2 display approximately 30-100 percent loss, including those that have been replaced by concrete.



Tiles with values ranging from 6-9 make up 59% of the tiles of New York State, values ranging from 3-5 make up 29% of the State, and tiles with a value of 2 or below, including those with no data recorded and tiles that have had a value of 0-2, including those that have been replaced, make up 12% of the State.

The location of the tiles is directly related to the values they were assigned and likely to the conditions they are subject to. The values ranging from 6-9 are located in the eastern and southern portions of the pavement, where the majority of vegetation and debris was found during the 2006 site visits, when they were removed. The debris included decomposing plants and dirt which likely provided a protective covering for the tiles. Some of the vegetation was growing out of the piles of mud while other plants had taken root in the tiles, causing damage and making their removal difficult.

The tiles with the lowest values are present in a horizontal band in the eastern portion of the pavement and clustered around the tiles that have been entirely replaced; indicating areas that had suffered damage early on and were filled in during periodic maintenance efforts after the Fair and roller rink were closed. The tiles with low values on Long Island may have suffered due to souvenir theft and the placement of a dumpster on the Long Island Tiles, observed during a 2004 visit, and whose weight or movement may have caused additional damage.<sup>69</sup> The horizontal band of tiles in the eastern section of the pavement are located in the region where vegetation and debris were found, as well

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<sup>69</sup> Amel Chabbi. "Restoring a 20<sup>th</sup> Century Terrazzo Pavement: A Conservation Study of the Floor Map of the New York State Pavilion Queens, New York", (masters thesis, University of Pennsylvania, 2004, pp.30

as standing water. The contrast between the tiles that were protected from damage due to a covering of mud and plant matter, and those that were heavily deteriorated, are likely due to the ability of plants to thrive and develop deep root systems in areas that remained damp for longer and were protected from the sun. The high walls of the Pavilion blocked the sun from the southern and southeastern portion of the pavement during the site visits in October and November when the sun does not reach its highest point in the sky.

The drain that was clogged during the site visits is located in the eastern section of the pavement, likely contributing to the standing water and prevalence of plants. The horizontal band of tiles in poor condition that stretches across the tiles of the State, approximately south to north on the pavement, may be directly related to this. The drain must have been connected to a drainage pipe to transfer the water outside the Pavilion and would likely have been tied into other nearby pipes. The Queens Theater, formerly the Theaterama, one of the original structures, has restrooms in the basement level. It is located just north of the band of tiles in poor condition, indicating that there could potentially be a drainage pipe that runs beneath the floor, in the direction of the Queens Theater. (Figure 18). The pipes may have rusted after 40 years and leaked, trapping water below. The water may have pooled beneath the tiles and escaped up through the tiles, rotting the plywood support.

The tiles valued between 3-5 are more evenly distributed but are not significantly represented in the eastern portion of the State. The geographic center of the State has

been identified on Map 1 and is directly beneath the ocular ring of the roof structure, where water would have entered the Pavilion originally and now acts as a roosting location for pigeons, whose waste was present on the tiles immediately surrounding the center tile. The ring also acts as a place for water to collect and drip from, concentrating the flow of water to those tiles that fall within its reach.

### 5.3 Assessment of Long Island

The survey of Long Island began by identifying and defining the seven conditions that were present on the 40 tiles that make up Long Island. Total loss, fill, moderate and severe network cracking, parallel cracks, incipient spall and deformation. This survey was designed to be an intermediate level survey that identified and defined the seven major conditions and their areas and percentages.

The seven identified conditions are represented as follows: 36% minor network cracking, 21% severe network cracking, 12% moderate network cracking, 18% total loss, 7% fill, 5% deformation, 1% Spall, and less than 1% parallel cracking. (Appendix E, Map 2). The seven conditions are not evenly distributed within each tile, however. Percentages of each condition were also quantified for every tile where that condition appears, to locate the tiles with the highest percentages of each condition and their relationship to each other. The tiles that were given a lower value in the overall survey, and tiles that display the highest percentages of the represented conditions, are located in the western portion of Long Island, in the New York City region. A comparison between the overall values assigned to each tile, and the percentage range of a particular condition

per tile in Long Island, show the correlation between the overall number and the degree of damage. Map 3, shows the comparison between the percentage of tiles containing loss, fill, and the overall condition. (Appendix E, Map 3).

The prevalence of certain conditions within certain tiles is largely due to the configuration of the tiles. The shape of Long Island which is outlined by plastic insets, and the internal roads, place names and signs, divide up the tiles into sections, in some cases allowing a condition to form and in other cases, restraining it. While it is hard to determine if tiles with a higher density of insets and multiple terrazzo colors contain more damage, it is clear that the configuration of the insets has a direct relationship to the shape of the conditions present. The tiles that would likely have had the highest density of insets, are the tiles that make up New York City, due to the number of roads and the level of detail included in dense urban areas. The majority of the tiles from New York City are in fact mostly missing or filled with cement, indicating that the presence of many small insets may have been a factor in its deterioration. Souvenir theft however, may also be factor. Map 4 shows the photo montage of Long Island overlaid with two levels of cracking and a yellow outline to highlight the shape of Long Island. The outline was traced from the actual pavement representation of Long Island, and the areas that were missing, were traced from a 1960 Texaco road map, to approximate as closely as possible, the original design. (Appendix E, Map 4)

In many cases, the cracking follows the outline of either the tile or the shape of Long Island, stopping where it runs into the plastic insets. While minor network cracking

is visible on many of the tiles that contain insets, these tiles have also been subject to loss. In many cases, loss consists of the absence of letters or symbols that have popped out of the terrazzo. In other case, such as the tiles at the bottom of the island, severe network cracking is seen in conjunction with loss and deformation and insets in this region are minimal. This may have more to do with the location of the tiles than the degree of insets. It is hard to know why the inconsistencies in tile condition occur, but location is clearly a factor and the presence of moisture may be to blame for the accelerated state of deterioration prevalent on certain areas.

#### 5.4 Informing a Methodology for Treatment

While a more detailed conditions assessment of each tile could focus on every conditions and variation on a condition that is affecting the map, at this stage of the project, it is important to make a correlation between what is happening on the representative tiles from Long Island and what is likely happening on the rest of the map. The overall assessment provides a broad overview of the areas that are good, intermediate and poor condition. The similarity between the overall values assigned to Long Island and the corresponding percents of the tiles with the highest level of a condition provide a framework for determining the level of damage present and ultimately the kind of intervention that may be needed on the rest of the pavement.

**CHAPTER 6: RECOMMENDATIONS AND CONCLUSIONS**

How to preserve the terrazzo pavement of the New York State Pavilion is a two part question in which the physical condition and the visual display of the pavement are the primary concerns. The parameters for display options include the precedents for repair set by both the mosaic conservation field and the terrazzo industry, but are also bound by the unique history and design of the Pavilion and the participation of the public as the recipients and visitors. While discussion of the current conditions and the philosophical issues regarding conservation has been addressed separately, they are inherently linked in any future decision about treatment and approach to the pavement. The current plan to bury the pavement for protection until its future is decided, will slow the deterioration process until funding and an appropriate future use can be determined. If it is decided to retain the structure and the terrazzo pavement, a comprehensive plan for stabilization and use of the Pavilion will need to address the conservation and display of the pavement to the public. The goal of this thesis was to provide a framework for developing a methodological approach to treatment and display of the terrazzo pavement with consideration of the impact of physical intervention and public reception.

The first decision regarding the future of the pavement is whether or not it will be preserved in situ. As part of Philip Johnson's design for the 1964-65 World's Fair, the pavement is an integral part of the structure, the exhibitions celebrating New York State, and the largest work of Pop Art from the first major public presentation of Pop Art. The

experience of visiting the pavement in its original environment is central to understanding its historical context and design intent.

The first consideration for preserving the pavement in situ is the stabilization of the surrounding structure and the reinstallation of a protective roof. As an original feature of the Pavilion, its reinstallation would be in keeping with the original design and could either be replicated in kind or feature a new design made of different materials, that do not mimic the original.

Other site conditions that would need to be addressed in order to have the tiles remain in situ is the lack of sufficient drainage and pitch of the floor to allow it to shed water sufficiently. The tiles would need to be temporarily stabilized and moved off site while any repairs and modifications are made to the structural slab. The tiles would need to be placed on a new support due to the rotting plywood that the terrazzo topping and underbed rest on.

The conservation approach would have to consider the level of intervention that was appropriate and reconcile this with the goal for public interaction with the floor. Displaying the pavement as a functioning floor the way it was intended to be seen is an important decision regarding the experience that it would provide for the visitor and the level of conservation that it would require. The appeal of walking across the largest road map in the world was an attraction during and after the Fair, and to deny the public the experience of interacting with the pavement would compromise the function of the pavement and the appeal of seeing the place names up and craftsmanship up close.

A two part approach to conservation would allow the pavement to be presented as a functioning floor, restrict heavily damaged areas, and provide the opportunity to vary the level of conservation treatments, respecting the existing fabric. In order to determine what level of conservation is required to make the pavement a functioning floor, the goals of the treatments must be outlined. The tiles would need to be temporarily stabilized, removed, and placed on new supports to prevent further deterioration, and address the deformation that is likely caused in part by the failure of the frame and plywood support. Consolidation of the loose and severely cracked tiles would be necessary to stabilize the terrazzo, and a ultimately a sealer would need to be applied to protect the floor from abrasion and moisture absorption.

While these major steps would address some of the stabilization concerns, the visual impact and compatibility of new materials would need to be addressed for public presentation and display. Cleaning the surface would be the first step in determining the level of discoloration of the terrazzo. While grinding is a frequently implemented technique to reveal the original color below, and to remove existing coatings, it would significantly alter the aged appearance of the New York State Pavilion terrazzo and irreversibly remove original fabric. The age of the Pavilion and its 40 year history of decline are an important part of the story of the pavement and a reflection of its intended use, which was only temporary. While it has suffered serious deterioration, its endurance is remarkable as well. While the once vibrant colors were an important part of the translation of a road map, the imagery and the now muted colors are still discernable and successfully communicate the designated roadways and places within the State.



The question of what materials to use in conservation treatments could depend on the conditions being treated. Cracks and areas of loss could be measured and each level of a condition and determined significance could be given a designated treatment. For example, very fine cracks within a range of widths, may be filled with a tinted mortar, while larger areas, may include marble chips to match the size and texture of the original chips used. The use of traditional terrazzo materials that are compatible with the original materials is important for the stabilization of the tiles and the visual impact that repairs will have. A system of reintegrating areas of loss could be developed based on a conditions assessment, based the level of deterioration present and the significance of the loss. Factors to consider are the presence of map imagery, the size and shape of a lacuna and the ability to replicate the lacuna. Texture and color are very important to integrating areas of loss and most importantly communicating the design. Differentiating between the original fabric and a repair would need to be addressed based on the severity of the condition being treated. Large areas of loss could be delineated with a subtle change in color or texture, indicating an addition, while allowing the map to be read as a whole. New York City for example, is largely missing and a recreation or representation of what was there is crucial to displaying the map and the “You are here” sign, pointing to the World’s Fair Site in Queens. The Texaco road map from 1960 is an important artifact for determining what the pavement was based on, and what liberties were taken in its manufacture. Given the similarities between the pavement and the map, a replication in kind of heavily deteriorated and significant tiles may be undertaken with a new terrazzo tile, or replaced with an image of the Texaco road map in its place.

The conservation and preservation of the New York State Pavilion pavement, provides a unique opportunity to develop a methodology and intervention philosophy for treating, repairing, and displaying significant terrazzo pavements. The research undertaken by the NCPTT and GSA on alternative methods for repairing historic terrazzo may provide important information regarding conservation treatments and provide a forum for discussion about how to make appropriate decisions regarding terrazzo.

The lack of literature that discusses replacement options for terrazzo and ethical and philosophical issues related to treatments has lagged behind the technology of terrazzo manufacture and repair. The ability of manufactures to closely match damaged original fabric in material composition, color and surface texture provides many opportunities for repair but little information nor discussion on the long term effects and irreversibility of techniques like surface grinding.

The transition or change in perception, of terrazzo, from a functional material to an artistic medium, is the shift that the industry needs, in order to recognize the value of the material and broaden its approach to treatment. The history of the New York State Pavilion and above all, the lasting impression and enduring fascination with the largest road map in the world, is what makes the conservation and presentation of this terrazzo pavement so important, and will likely be the driving force behind its support and future protection.

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## **APPENDIX A: FIGURES**

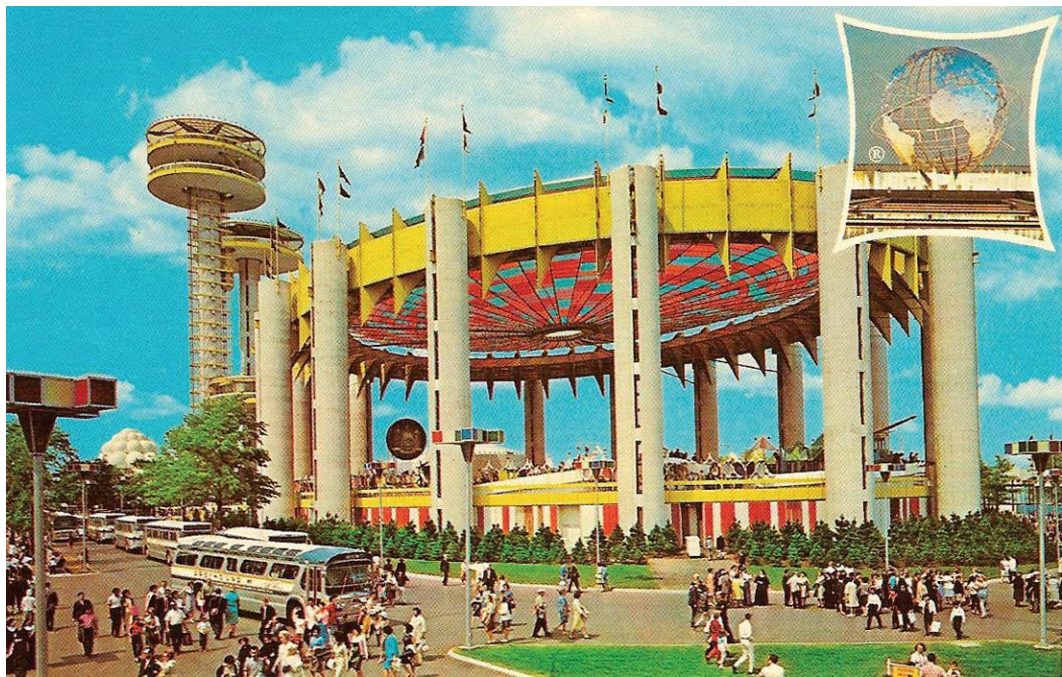


Figure 1: Postcard of the New York State Pavilion, 1964. Source: author.



Figure 2: The New York State Pavilion at Night, during the 1964-65 Fair.



Figure 3: Pop art on the exterior of the Theaterama during the 1964 Fair. Source: Rosemarie Bletter, *Remembering the Future, The New York World's Fair from 1939 to 1964*.

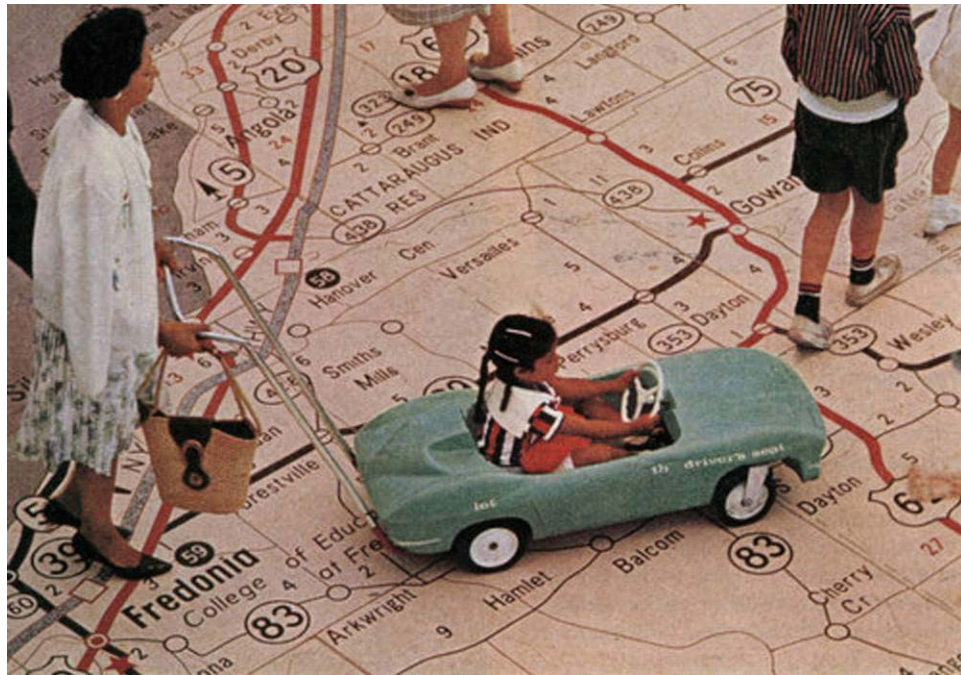


Figure 4: The Terrazzo Pavement during the 1964-65 World's Fair. Source: "The Fair Reopens". National Geographic. 127, no.4 (April, 1965): 503-529



Figure 5: Before restoration of the terrazzo in St. Joseph's Library, St. Joseph Missouri.  
Source: [http://www.ntma.com/07\\_2005\\_honor\\_awards\\_desc.php?job\\_name=stjoseph1](http://www.ntma.com/07_2005_honor_awards_desc.php?job_name=stjoseph1)



Figure 6: After restoration of the terrazzo in St. Joseph's Library, St. Joseph Missouri.  
Source: [http://www.ntma.com/07\\_2005\\_honor\\_awards\\_desc.php?job\\_name=stjoseph1](http://www.ntma.com/07_2005_honor_awards_desc.php?job_name=stjoseph1)



Figure 7: A damaged and patched terrazzo star from the Hollywood Walk of Fame.  
Source: Loss Angeles Times, February 9, 2007. <http://www.latimes.com/news/local/la-me-stars9feb09,1,3826359.story?page=2&cset=true&ctrack=1&coll=la-headlines-california>



Figure 8: The terrazzo floor in the lobby of the East Columbia Building before conservation. Source: Andrea Morse, Sculpture Conservation Studios.



Figure 9: The terrazzo floor in the lobby of the East Columbia Building, after conservation. Source: Andrea Morse, Sculpture Conservation Studios.





Figure 10: The exhibit of the Triclinium floor mosaic. Source: *The Arts of Antioch*, Becker and Kondoleon, 2005.



Figure 11: The St. Vitus Mosaic before conservation. Source: *Conservation of the Last Judgment Mosaic*, The Getty Conservation Institute, 2004



Figure 12: The St. Vitus Mosaic after conservation. Source: *Conservation of the Last Judgment Mosaic*, The Getty Conservation Institute, 2004



Figure 13: Visitors standing by the in the Queens section of the terrazzo pavement in the late 1980's.  
Source: Andy Looney, <http://www.wunderland.com/WTS/Andy/nywf.htm>



Figure 14: Detail of a damaged terrazzo tile showing the metal frame, terrazzo, underbed and a hold where the plywood support has rotted. Source: Photo by author.



Figure 15: View of a terrazzo tile from below with rotting plywood. Source: Photo by author.



Figure 16: Detail of the insets and support system in a damage tile on site. Source: photo by author



Figure 17: Students collecting debris, loose terrazzo, and plastic in November 2006.  
Source: photo by author

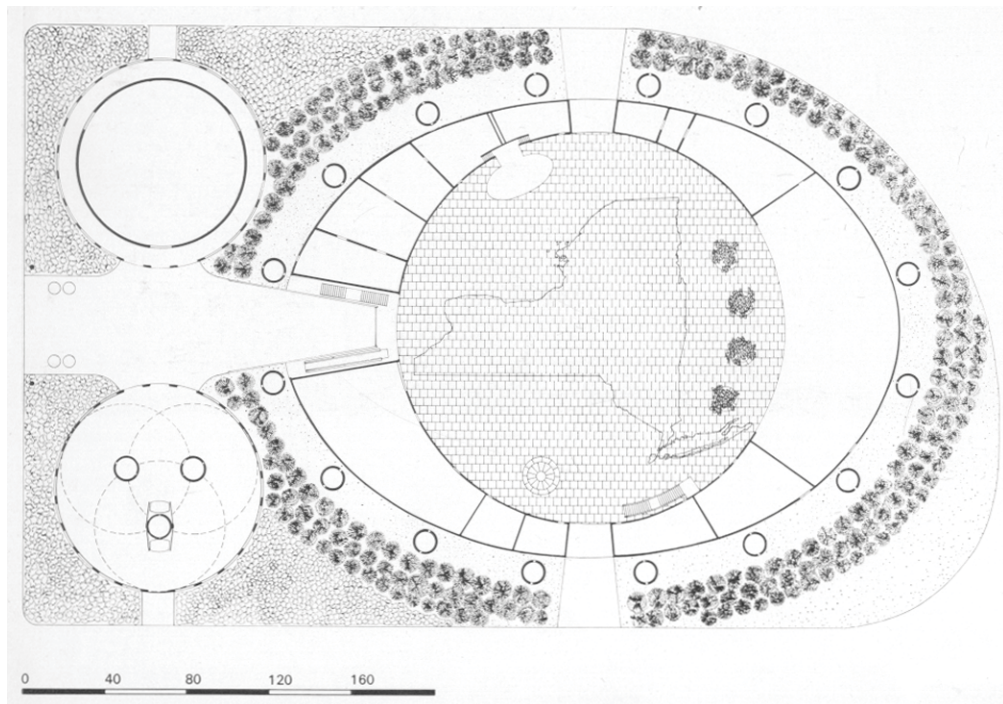
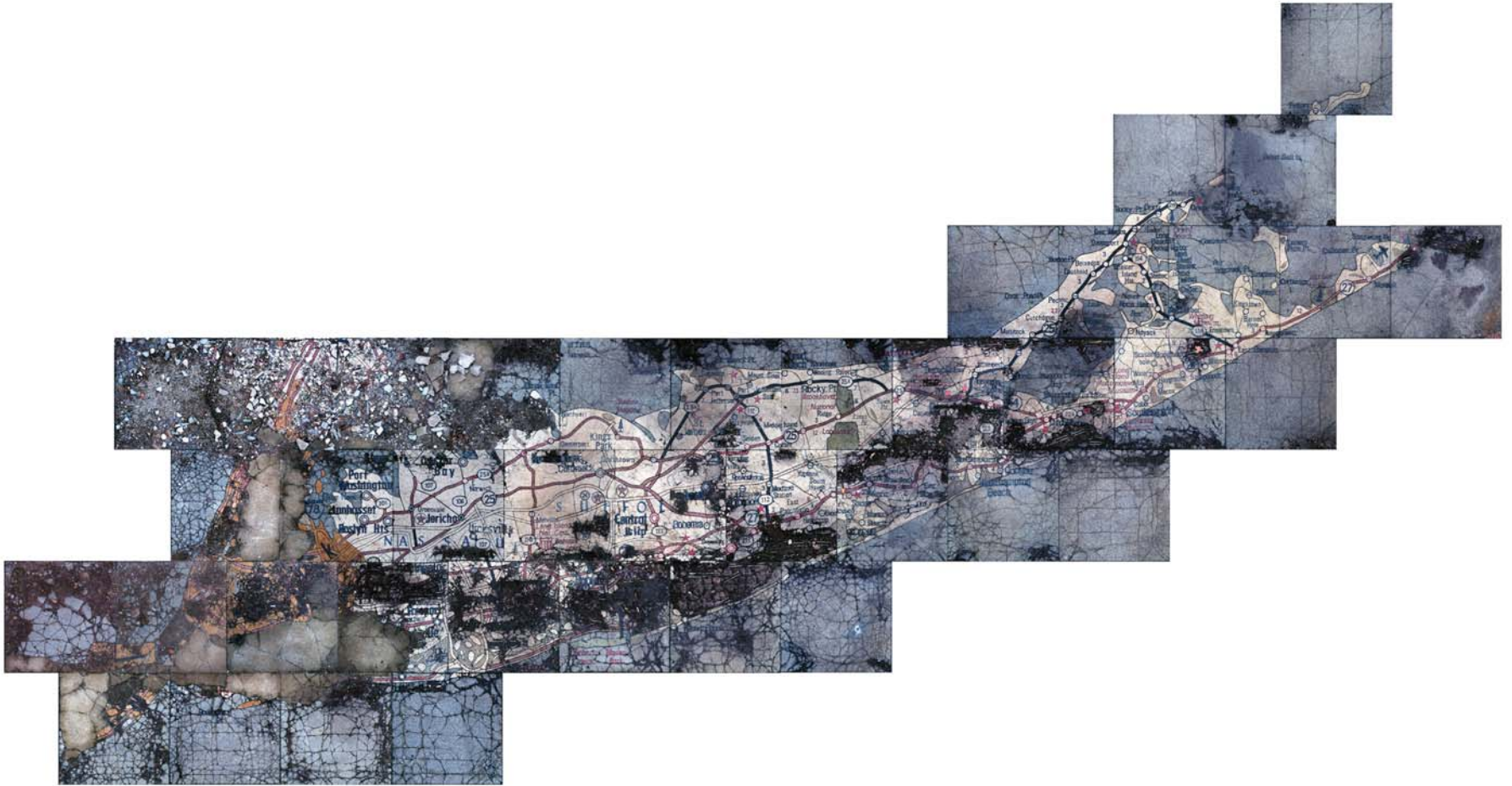


Figure 18: Philip Johnson's Plan of the Pavilion with the Theaterama and the observation towers.  
Source: *Philip Johnson, Architecture 1949-1965*, 1966.

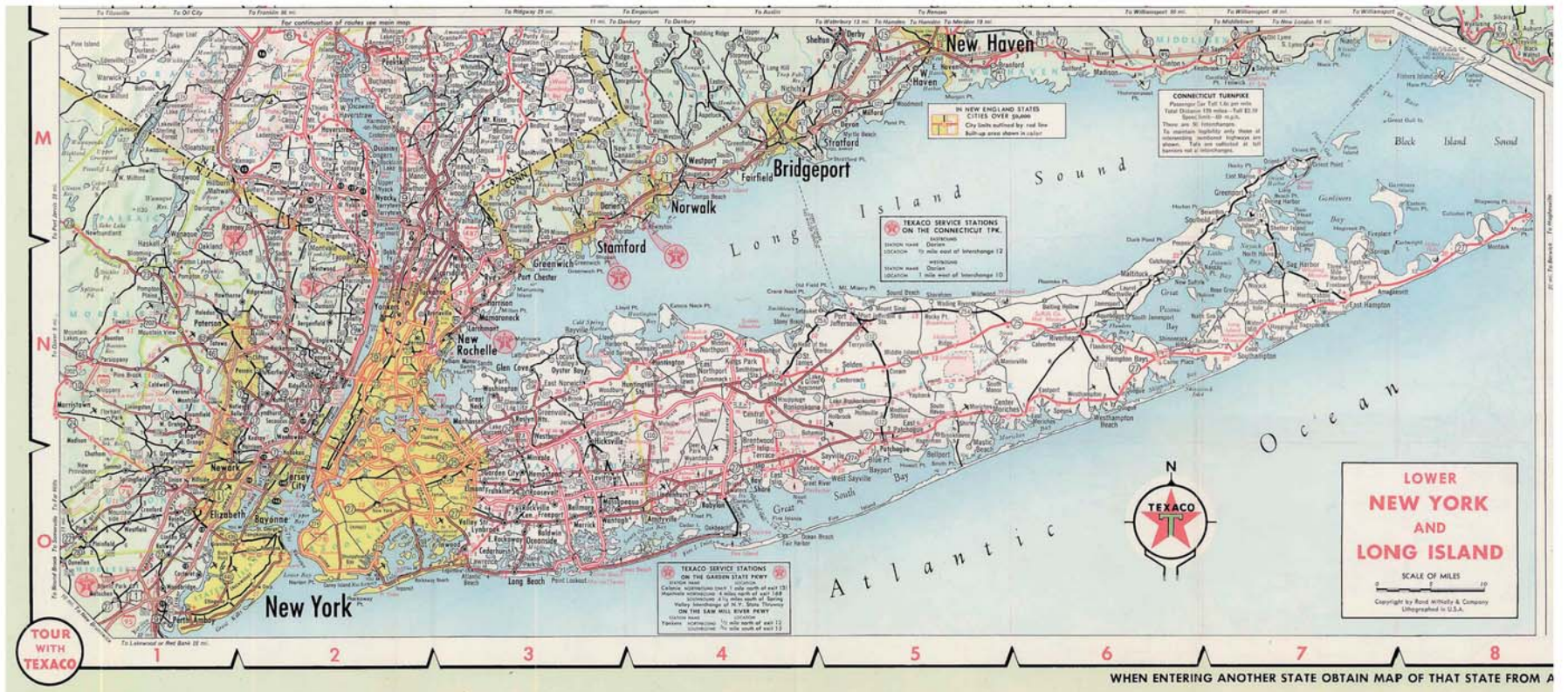
**APPENDIX B: PHOTO MONTAGE OF LONG ISLAND TILES**





The 40 Terrazzo tiles that comprise the Long Island section of the terrazzo pavement. Photos by John Hinchman, November 2006.

**APPENDIX C: 1960 TEXACO ROAD MAP**



The Long Island section of a Texaco road map of New York State from 1960

**APPENDIX D: CONDITIONS GLOSSARY**

Loss: The absence of terrazzo or plastic insets revealing the substrate below.



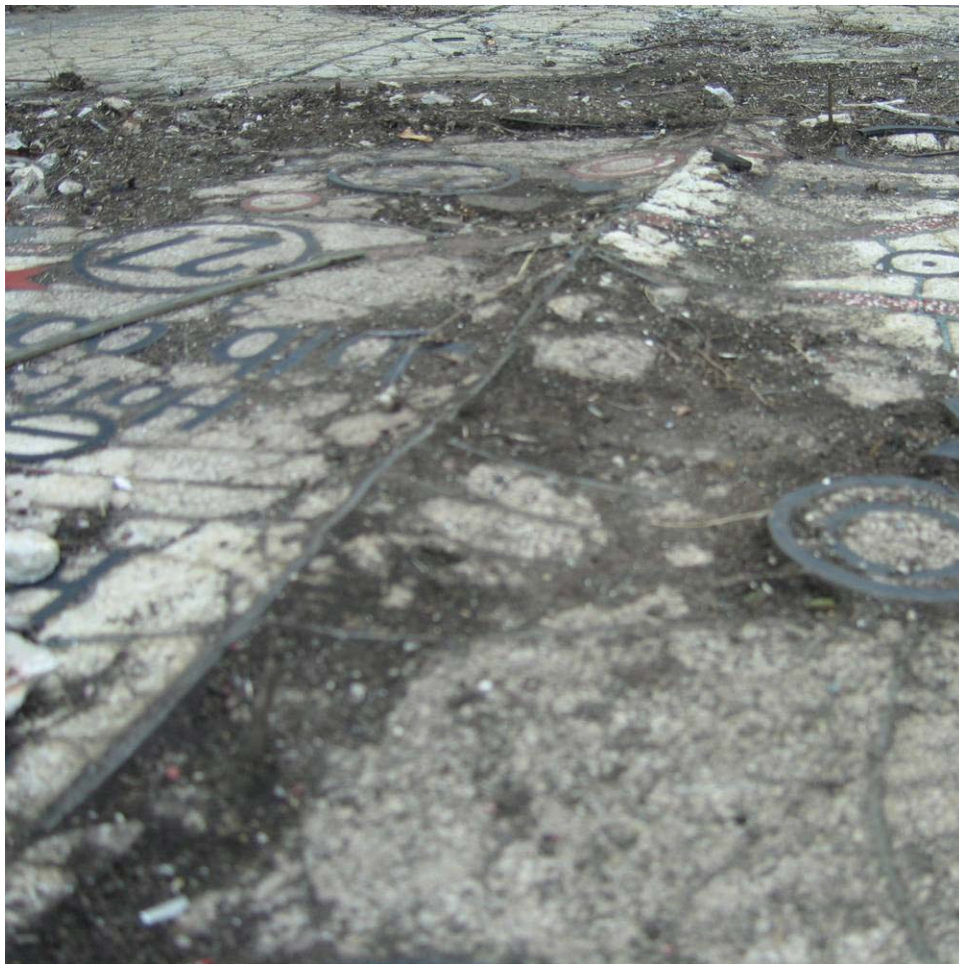
Fill: The presence of cement that filled a previous area of loss.



Incipient Spall: Terrazzo that has begun to detach from the panel but still remains connected. Often seen in association with loss, cracking, debris, and vegetation.



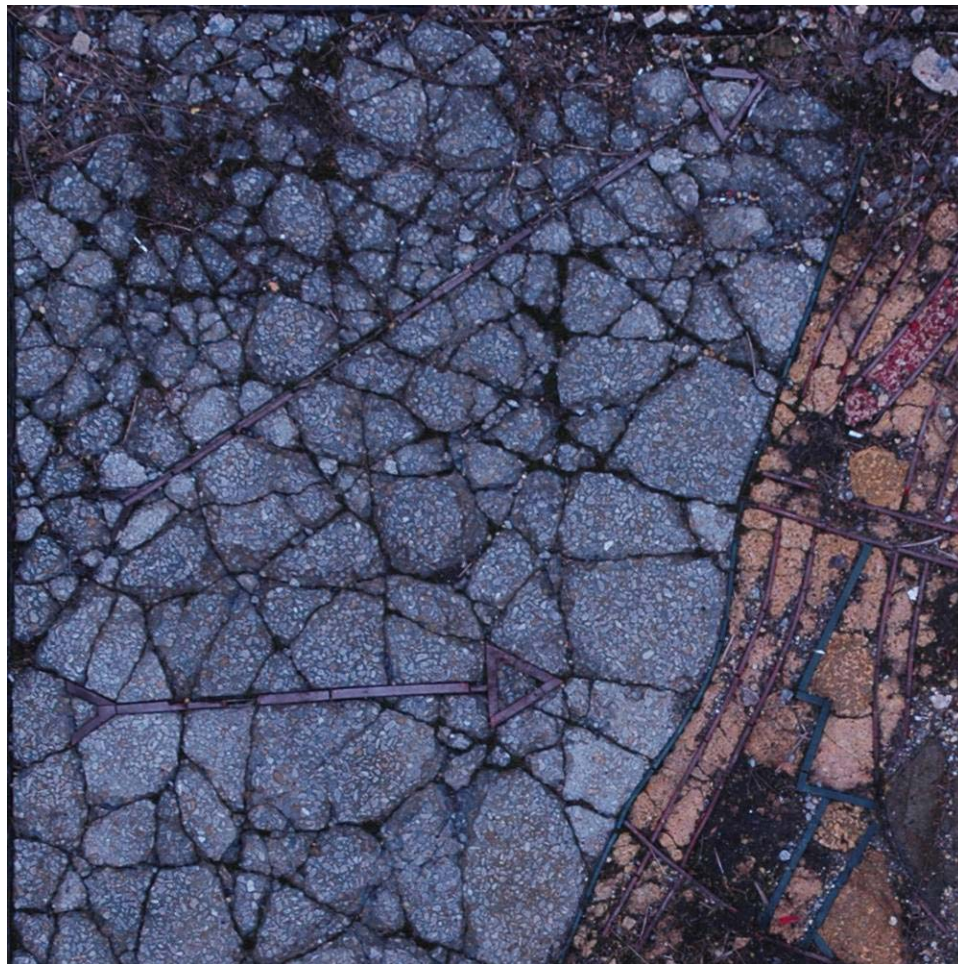
Deformation: Deformation is characterized by the concave warping of the panel, whereby the center is lower than the perimeter edge.





Network Cracking: A patterned arrangement of cracks that have been divided into three levels of severity.

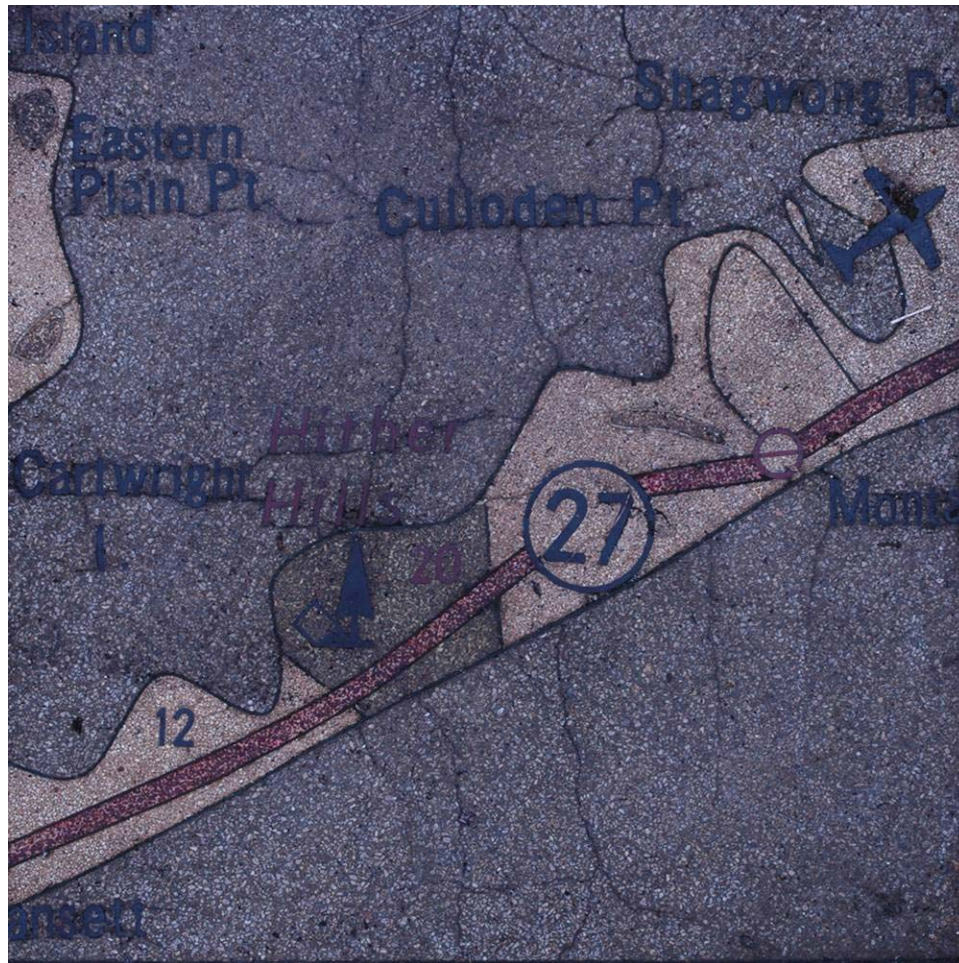
Severe Network Cracking: Cracks that have penetrated the terrazzo topping, forming “islands” of terrazzo. Deformation is often seen in conjunction with this condition.



Moderate Network Cracking: A network of cracks that penetrate the terrazzo but where the integrity of the terrazzo and overall imagery are still in tact. Cracks are deeper than the minor network cracking but do not create “islands” of terrazzo like severe cracking.



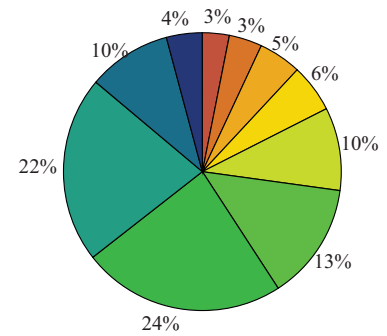
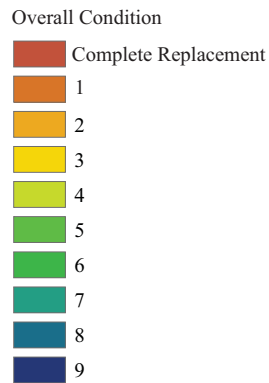
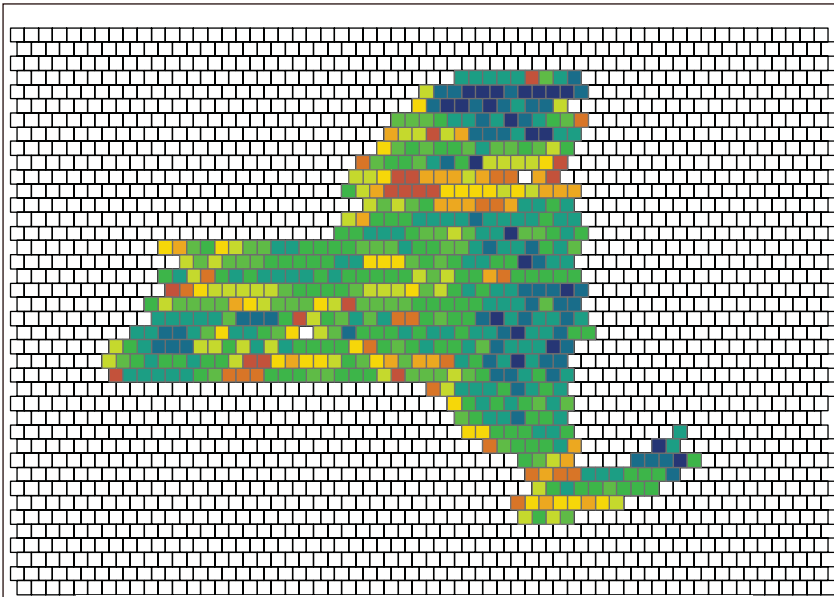
Minor Network Cracking: Cracks that remain close to the surface of the terrazzo and do not contribute to deformation of the panel.



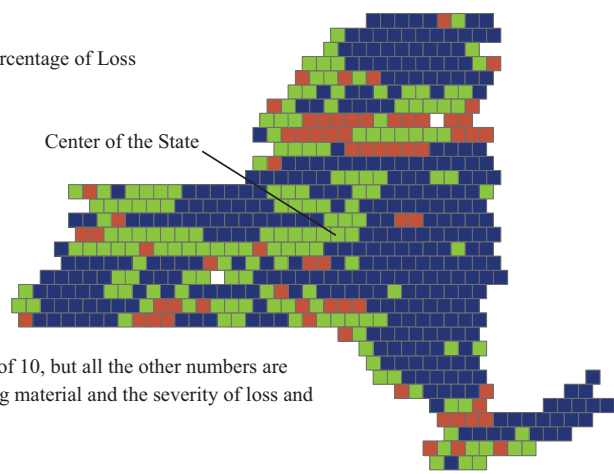
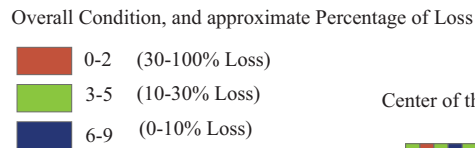
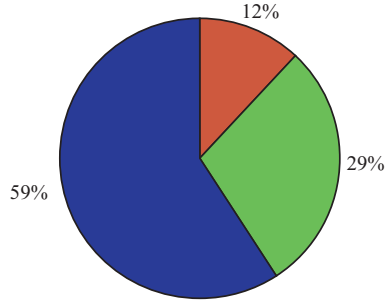
*Parallel Cracking*: Cracks that appear parallel to each other and the edges of the tile.



## **APPENDIX E: GIS MAPS**

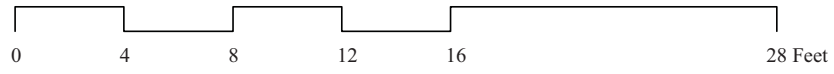
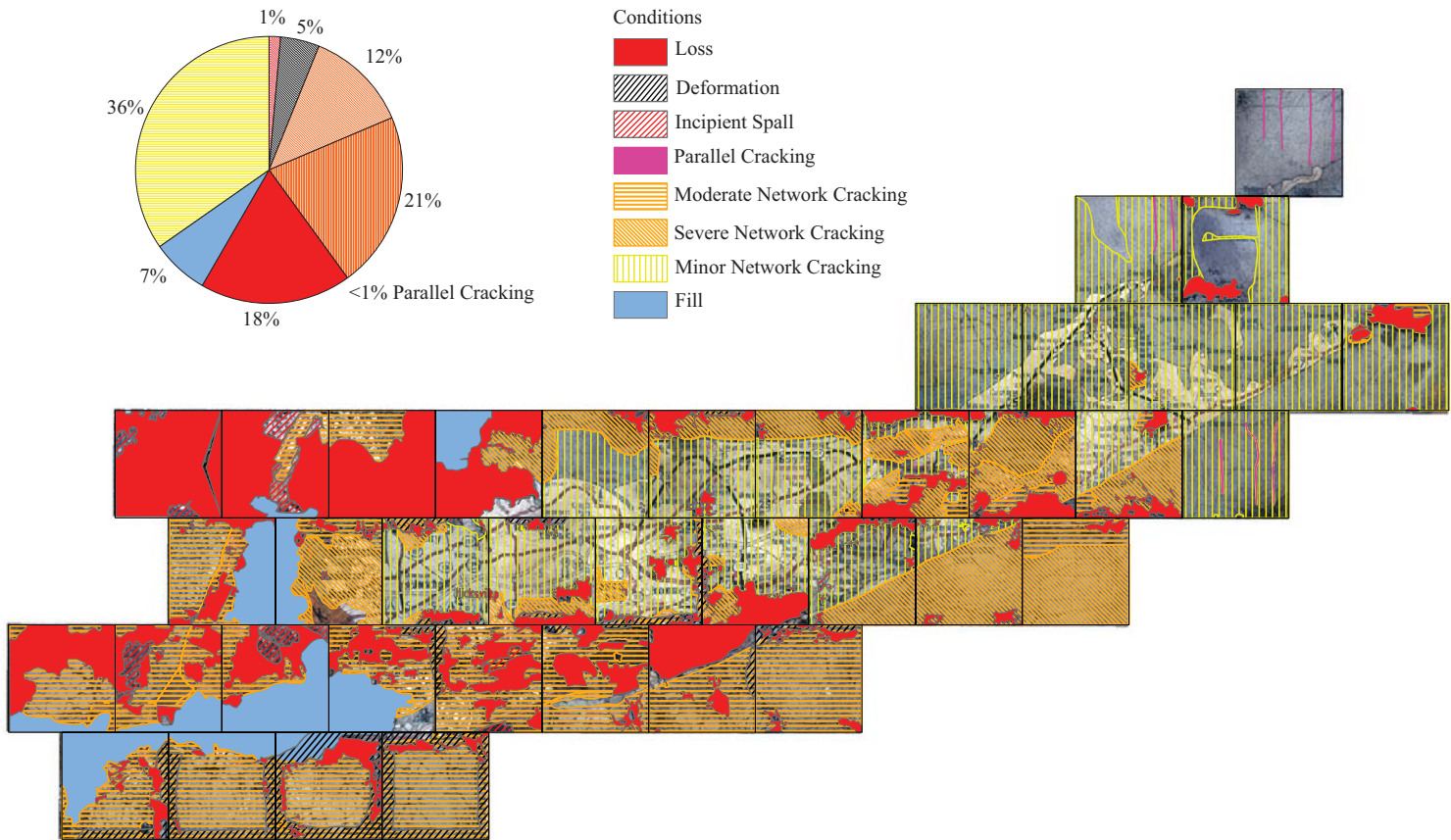


0 16 32 48 64 128 Feet



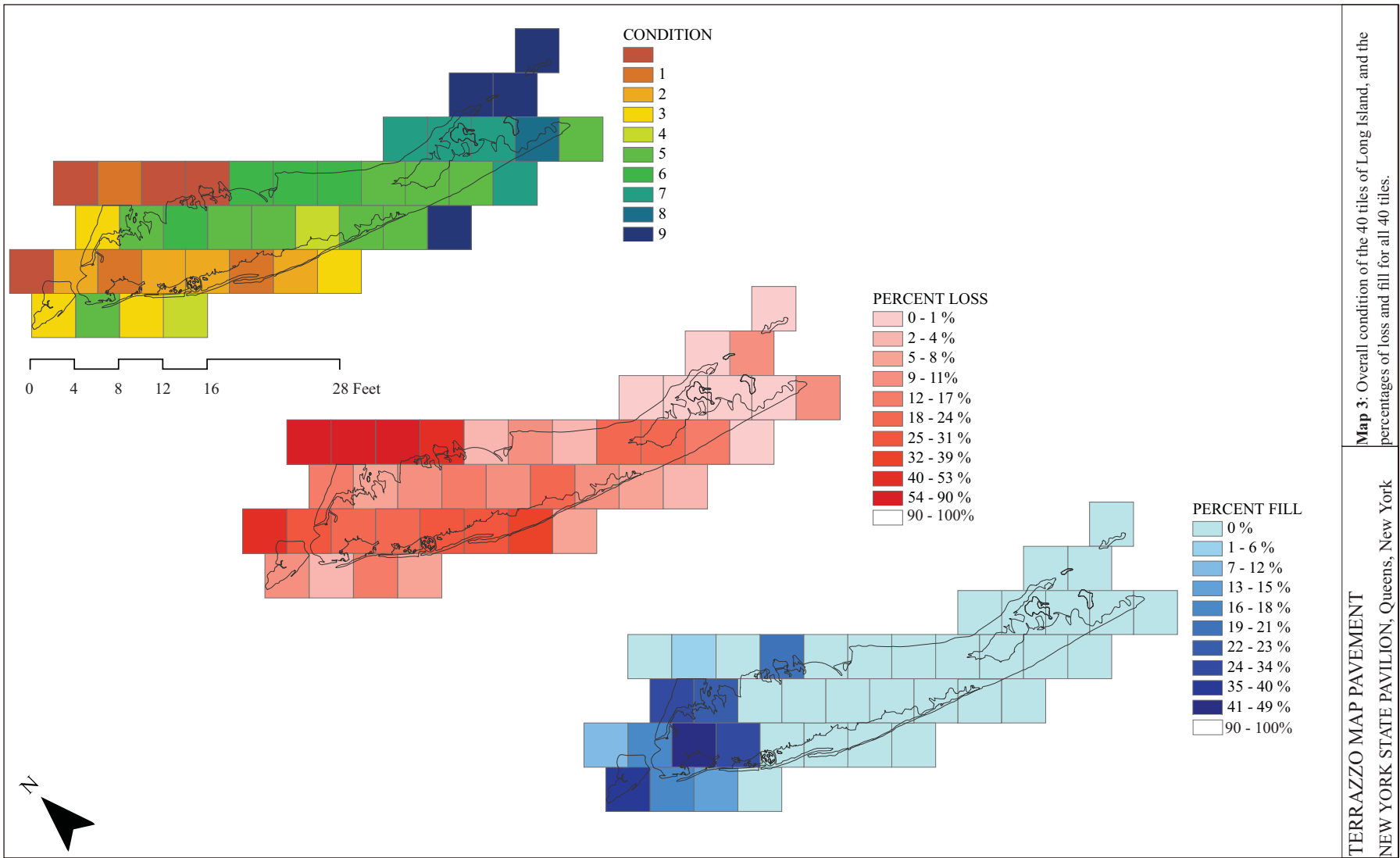
All 567 tiles within New York State were given a value on a scale of 1-10. No tiles were given a value of 10, but all the other numbers are represented. The values represent the overall condition of each tile based on the integrity of the existing material and the severity of loss and damage. A value of "0" indicates tiles that have been replaced with cement.

Map 1: Overall Conditions of the 567 tiles of New York State.



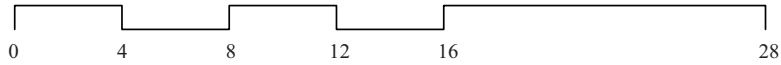
Map 2- Conditions Assessment of Long Island






TERRAZZO MAP PAVEMENT  
NEW YORK STATE PAVILION, Queens, New York

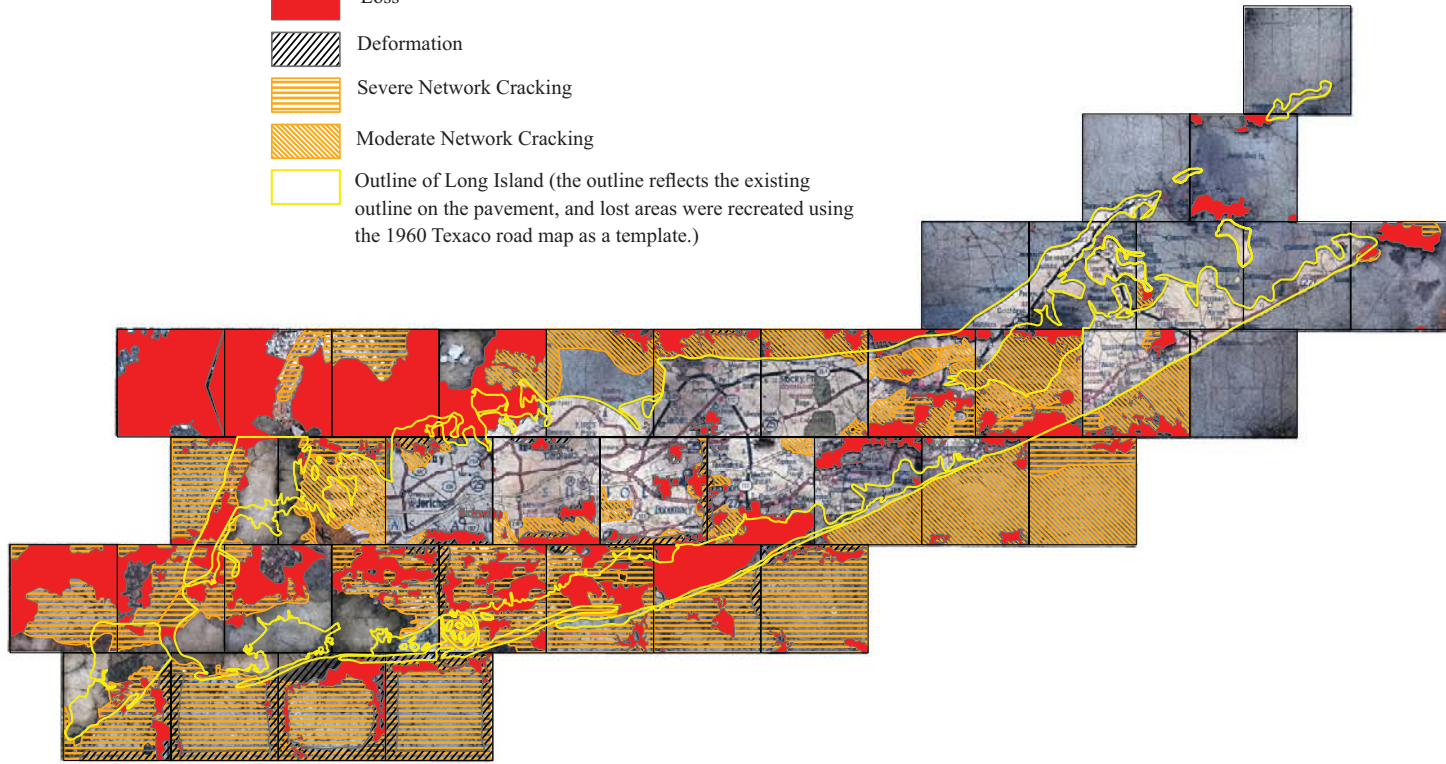


**Map 3:** Overall condition of the 40 tiles of Long Island, and the percentages of loss and fill for all 40 tiles.





-  Loss
-  Deformation
-  Severe Network Cracking
-  Moderate Network Cracking
-  Outline of Long Island (the outline reflects the existing outline on the pavement, and lost areas were recreated using the 1960 Texaco road map as a template.)



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