# Red Brick Road Condition Assessment, 196th Avenue NE, King County, Washington

December 22, 2015

King County Department of Transportation Project Number 1126665
Contract Number P00112P12, Work Order Request Number 12
SWCA Project Number 24958.12
Report Number 15-676

King County

CULTURE

SWCA Environmental Consultants
Seattle, Washington

# RED BRICK ROAD CONDITION ASSESSMENT
# 196TH AVENUE NE, KING COUNTY, WASHINGTON

Report Prepared for

King County Department of Transportation, Road Services Division

By

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# CULTURAL RESOURCES REPORT COVER SHEET

Author: Robert Krier, Eileen Heideman, Sharon Boswell

Title of Report: Red Brick Road Condition Assessment, 196th Avenue NE, King County, Washington

Date of Report: December 22, 2015

County(ies): King    Section: 7, 8, 17, 18 Township: 25N Range: 6E
Quad: Bellevue North    Acres: 7.7

PDF of report submitted (REQUIRED) ☒ Yes

Historic Property Inventory Forms to be Approved Online? ☐ Yes ☒ No

Archaeological Site(s)/Isolate(s) Found or Amended? ☐ Yes ☒ No

TCP(s) found? ☐ Yes ☒ No

Replace a draft? ☐ Yes ☒ No

Satisfy a DAHP Archaeological Excavation Permit requirement? ☐ Yes # ☒ No

Were Human Remains Found? ☐ Yes DAHP Case # ☒ No

DAHP Archaeological Site #:

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# PROJECT BACKGROUND AND DESCRIPTION

The Red Brick Road, which is also known as 196th Avenue Northeast, is a 1.3-mile segment of a brick-paved roadway located in Township 25 North, Range 6 East, following the section line between Sections 7 and 8, as well as a small portion of Sections 17 and 18. The road's north-south alignment connects Northeast Union Hill Road on the north and the Redmond-Fall City Road (State Route 202) on the south (Figures 1 to 3) and is immediately to the east of the City of Redmond in King County, Washington. Built in 1901 and originally called the James Mattson Road after a local landowner, the road was repaved with brick in 1913 (Figure 4). It became an important connection to the route across Snoqualmie Pass and ultimately part of the well-known cross-country highway, the Yellowstone Trail.

King County Road Services Division (RSD) was awarded a grant from 4Culture, a public development authority that provides support and funding for cultural services in King County. The grant enabled RSD to engage SWCA Environmental Consultants (SWCA), which was asked to conduct a visual review of the road and evaluate its current condition. This conditions assessment provides a preliminary overview of issues that should be addressed and is not intended to be an engineering document. The goal of the project is to identify potential problem areas and provide recommendations for further study and action.

This report begins with a brief background on the history of the road, reviews previous reports related to its condition over time, describes the field survey and current conditions, and makes recommendations for ongoing maintenance and management of this historic resource. Also included is an inventory and count estimate of bricks stockpiled for future repairs of the Red Brick Road.

## HISTORIC CONTEXT

The Red Brick Road played a vital role in the transportation development of the Puget Sound area. The following brief historic context focuses on the evolution of overland transportation systems in western Washington and particularly the linkage of the Red Brick Road to routes over Snoqualmie Pass and to the early cross-country highway known as the Yellowstone Trail. Research is primarily drawn from King County records and other documentation, including the National Register of Historic Places (NRHP) nomination and the King County Landmark nomination for the Red Brick Road.

### Initial Road Construction

Early travelers through Washington generally used water transport or followed Indian trails overland, so it was not until permanent settlers penetrated north of the Columbia River in the 1850s that serious agitation for road building began. Territorial roads, which were defined as thoroughfares that passed through at least two counties and were maintained by those counties on a pro-rata basis, formed the first highway system in Washington. In 1859 military roads were added to this category, and a decade later they all became known as county roads based on legislative action (*Daily Journal of Commerce* [*DJC*], April 15, 1955:3).

The first road authorized by legislative mandate in Washington was built in the 1850s during the territorial period, but generally the construction process was very slow (WSDOT 1994:9). Initially, counties took responsibility for most highway building, and the state played only a minimal role. In Thurston and Pierce Counties where there were large stretches of prairie, road construction was relatively easy, but in King County the terrain was generally steep and more difficult, and water


Figure 1. Red Brick Road location, showing relationship to nearby Redmond.


Figure 2. Red Brick Road location.

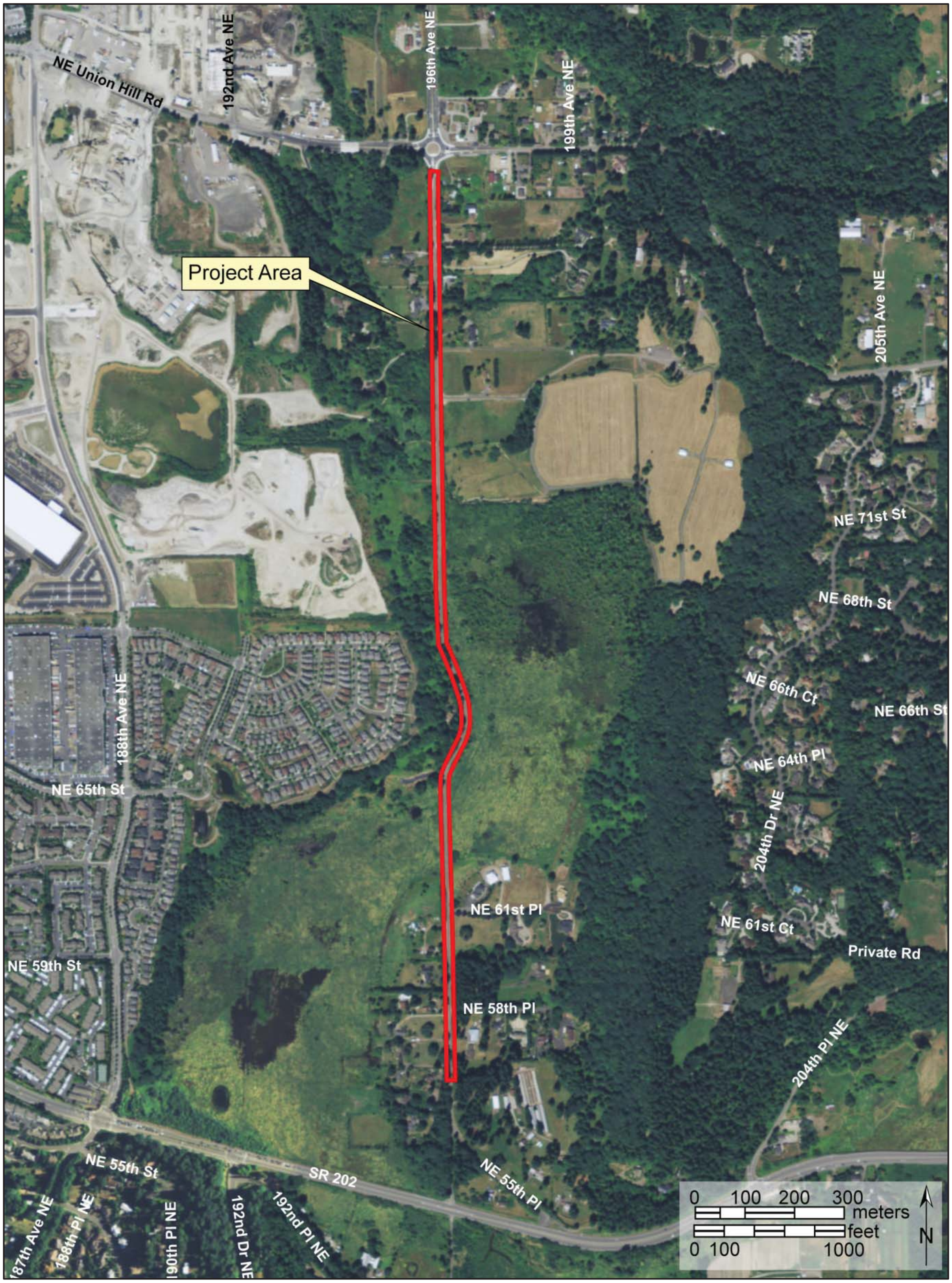



Figure 3. The Red Brick Road extends between NE Union Hill Road and Redmond-Fall City Road.

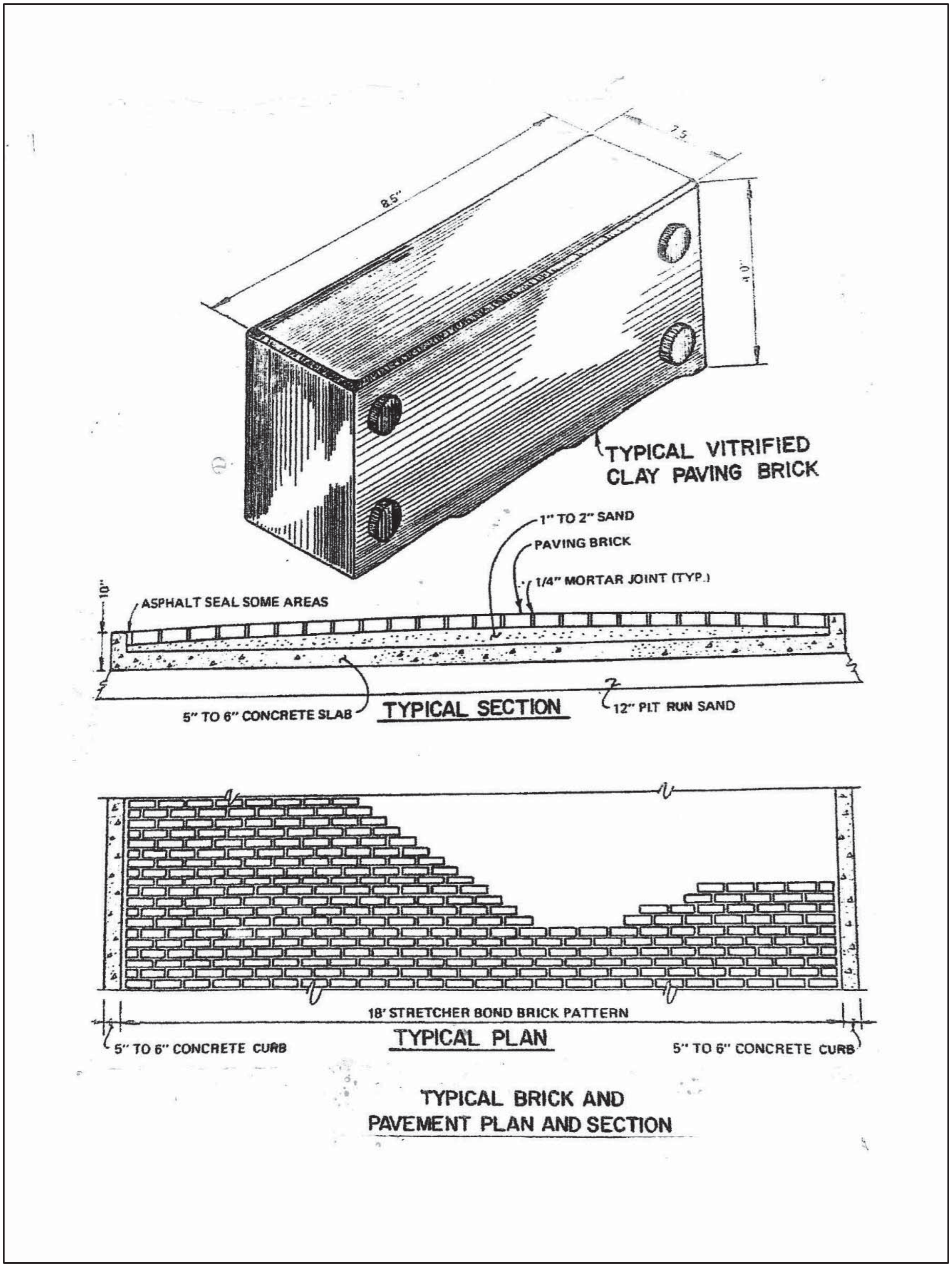



Figure 4. Diagram of typical plan and section of brick road (KCM 1986: Figure 4-1).

transportation remained important for several decades longer than in the South Sound area. The first major road in King County was surveyed in 1854, with plans to connect Seattle to the military route between Fort Steilacoom and Fort Walla Walla (King County Road Engineer 1939:75).

## Snoqualmie Pass Route

The pioneer residents of Seattle and Puget Sound believed that transportation access through Snoqualmie Pass was a necessity for the future economic prosperity of the region. The federal government, which supported the idea of a military road connecting the coast to the Inland Northwest, had initially preferred an easier route along the Columbia River rather than through the steep mountainous terrain to the north. The city of Portland, Oregon, thus became the beneficiary of early traffic on this east-west route. As a result, construction of a permanent road through Snoqualmie Pass was initially left to the initiative of a few individuals, private companies, and local governments.

As early as 1855 the first Seattle-area survey party, which included prominent pioneer citizens such as Dexter Horton and Charles Boren, attempted to locate a potential wagon road through the mountains. The group followed two known trails, including one that extended up the South Fork of the Snoqualmie River. This particular route had previously been followed by Lieutenant Abiel Tinkham, who was commissioned in 1854 by Washington's first territorial governor, Isaac Ingalls Stevens, to explore the feasibility of a route through Snoqualmie Pass as part of the northern railroad survey (Richards 1993:138; Snoqualmie National Forest 1971).

Construction of a more substantial roadway was delayed by a period of conflict between settlers and Native peoples of the region as well as by the difficulty of the terrain, but the trail that was eventually established through the Cascades became a well-traveled route for miners and outfitters headed to the gold fields of northeastern Washington and Canada in the late 1850s. In 1865 another group of surveyors explored Snoqualmie Pass with plans to develop an easily passable highway and with a sum of money raised among Seattle supporters began construction of a wagon road from North Bend (then called Ranger's Prairie) over the summit (King County Road Engineer 1939:79; Prater 1981:29-231).

A force of 20 men built 25 miles of road, but travelers trying to get their wagons through the pass also helped to improve other sections. With additional funds from the state legislature and King County, the wagon route was completed from Seattle through Snoqualmie Pass to Ellensburg in 1867. The Snoqualmie Wagon Road changed the entire economic landscape of the Northwest. Portland had previously been the commercial center of the region because of its location along the Columbia River and at the head of a major overland trail, but with the completion of the wagon road through Snoqualmie Pass, both settlers and tradesmen had more direct access to Puget Sound. Cattlemen, in particular, found that it was much less expensive to drive their herds through the pass than to ship them by steamer to Portland and pay exorbitant freight rates. The first cattle drives on the Snoqualmie Wagon Road began in 1869 and helped to encourage the development of a meat-packing industry in Seattle. Flour and other grain products from the agricultural areas east of the mountains also became an important trade item shipped to Puget Sound over Snoqualmie Pass (Prater 1981:30–32).

Settlement grew along Puget Sound as Seattle became a thriving city, but much of the land to the north and east was heavily forested, and few roads and bridges connected these outlying areas to population centers. Public demand for new roads exceeded the county funds available, and often local residents had to pay for needed improvements themselves. Coal discoveries and the hope of finding valuable minerals in the region helped to push the development of new access routes into the mountains and gradually a system of roads began to link most towns and cities in the county. By 1900 the focus of road building turned from new construction to widening, repaving, and other improvements for existing highways (King County Road Engineer 1939:82–83).

## Automobiles Bring Changes

The age of the automobile arrived soon after the turn of the century, and a few enterprising motorists began to cross the wagon road through the pass, possibly as early as 1905. In that same year the Highway Department was founded to lobby for and oversee new road construction, as there were still less than 1100 miles of state roads at that time, and of those, only 124.5 miles were classified as improved (WSDOT 1994:9). All of these earlier roads were designed for wagons and other animal-drawn vehicles, and it was not until around 1910 that the state began to plan its new roadway system for automobile traffic. In 1911 the legislature passed the Permanent Highway Act, which transferred more road building responsibility to the state and authorized the construction of hard-surface roads to enhance commercial transportation possibilities (WSDOT 1994:10). Automobiles ruined the road surface for horses and other types of vehicles, and so the state began to experiment with other road surfaces that could withstand this new type of traffic. Brick paving was tried in a few areas, and then in 1912 the state built the first concrete highways. Funds to underwrite these improvements were primarily raised through state property taxes levied each year (King County Road Engineer 1939:86).

Federal aid for highway construction was slow in materializing for several reasons. Before the booming interest in automobiles, the government had focused its transportation budgets on the development of railroads. The subsidies granted to the transcontinental lines, in particular, had overshadowed the need for national road expenditures. Also, roads at that time were considered “internal improvements” and thus potentially ineligible for governmental funding because of constitutional restrictions. As a result, local roads had generally developed in a piecemeal fashion, and many automobile enthusiasts believed that the most effective means of tying them into a cross-country highway system was through grass-roots efforts (Ridge and Ridge 2000:3–6).

Automobile clubs and Good Road Associations, which were usually made up of individuals with significant community clout, were among the most effective lobbyists for highway construction.
In Washington both the Kittitas County and Puget Sound area automobile clubs were particularly active in pushing for a Snoqualmie Pass road. In 1912 the Good Roads Association joined the effort to improve Washington highways and proposed three major “trunk” routes in the state: the Sunset Highway, the Pacific Highway, and the Inland Empire Highway. Sunset Highway would stretch from Idaho through Spokane, Wenatchee, Ellensburg, and Snoqualmie Pass and eventually link up with the Pacific Highway that followed the coast. This idea appealed to the state legislature, which approved a $2 million appropriation for these three primary state roads in 1913. Bids for the first 22 miles of construction on the Sunset Highway were accepted in 1914 and construction of a permanent highway through the Snoqualmie Pass began (Dorpat and McCoy 1998:82; Prater 1981:48–49). In 1915 Washington Governor Ernest Lister helped to dedicate the original Sunset Highway, calling it “Washington’s first passable route between the east and west sides of the mountains.” Much work remained, however, to make it a viable, year-round road (Dorpat and McCoy 1998:83).

## Yellowstone Trail

At the same time there were also nationwide attempts to link local roads into a regional and even national road system. In 1912 a group in South Dakota met and developed an organization that planned to promote a highway stretching from Minneapolis to Yellowstone Park. Their concept was that a coalition of small towns could influence county commissioners to join in an effort to build one long-distance road that would enhance the tourist trade and provide local access to a good highway. The group, which eventually became known as the Yellowstone Trail Association, did not build the road, but persuaded local governments to join in and helped to publicize and mark the route. The concept was successful, and by 1915, the association had plans to extend the road all the way to Seattle in the west and Chicago to the east (Ridge and Ridge 2000:8–9, 18).

Members of several automobile associations in Washington wanted to tie the Yellowstone Trail to a new route proposed in the state that was an amalgam of several old and new roads. The Washington portion would be renamed the National Parks Highway. Members of the Yellowstone Trail Association were inalterably opposed to the name change, and thus the two roads initially took different routes in the state. The Yellowstone Trail followed portions of the original Sunset Highway and then headed through Redmond, around the north end of Lake Washington. To mark it, local association members, called Trailmen, often painted the organization's traditional symbol—a yellow circle with a black arrow inside pointing to Yellowstone Park—along the route (Ridge and Ridge 2000:19–20, 39).

### James Mattson Road

Once the road through Snoqualmie Pass was established, travelers could choose from several different ways to access Seattle. Heading west from Fall City, one route continued to Issaquah and then ran north around Lake Sammamish to Redmond. Muddy conditions and lots of brush made this road very difficult throughout much of the year. A shorter and more popular road led directly from Fall City to Redmond, but its steep grades and torturous curves also posed dangerous traveling conditions. In Redmond, both routes connected to a road that ran over the hill to Kirkland, where ferry service provided transport across Lake Washington and there was also access to another wagon route around the north end of the lake (Polk 1974:8-1; Polk and Lentz 1983:5–6).

As traffic across Snoqualmie Pass increased and more settlement occurred in the eastern portions of King County, easier and safer alternatives were needed to reach Seattle and access other small towns in the area. In February of 1901, James Mattson, a landowner to the east of Redmond, filed a petition to the King County commissioners for a new road that would avoid some of the steeper sections of the other routes then in use. According to the petition, the James Mattson Road, 60 feet in width, would run as follows:

> …commencing at the Tolt Road, where it intersects with section corner common to Sections 5, 6, 7, 8, Township 25 North Range 6 east, running thence due north along section line between Sections 7 and 8 and Sections 17 and 18 of said township and range, and ending at the Fall City road at its intersection with quarter section corner between Sections 17 and 18, Township 26, Range 6 East, a distance of one and a half miles…(Petition for a County Road, Feb. 13, 1901, King County Road Packet, No. 578, Map Vault, Seattle, WA).

Thirty property owners in the vicinity signed the petition, and those who owned the land through which the road passed signed quit-claim deeds to provide right-of-way. The appointed viewers, who assessed the feasibility of the route, reported to the commissioners:

> The road passes for most part over bottom lands, but with heavy ditching, good tempering & graveling can be made good dry road at all seasons. The right of way should be slashed out full

> width so sun and wind can do their part toward keeping the road dry (Viewers Report, March 30, 1901, King County Road Packet, No. 578, King County Map Vault).

## The Red Brick Road

The dirt and gravel James Mattson Road quickly became part of the preferred route to Redmond from Fall City. As traffic increased, road conditions worsened, so in 1913, Mattson applied to King County to have the road resurfaced. He was supported by other local residents, who once again signed quit-claim deeds to provide additional land for the road right-of-way. The refurbished thoroughfare also received a new name, as it became part of the Redmond-Snoqualmie Road or County Road 952 (Polk 1974:5–6).

The timing of the resurfacing project coincided with the new national emphasis on permanent highway development and particularly the use of harder road surfaces to accommodate the use of automobiles and other motorized vehicles. Krist Knudson, a King County Commissioner, oversaw the paving project, which consisted of the installation of a brick surface rather than the more common macadam process. According to one source, the bricks were obtained from a Renton brick yard, and a crew of four or five men laid them by hand on top of a base of concrete-type material covered by a 2-inch layer of sand. Evidently, the concrete curing time was fairly slow and residents were forced to use a bypass route for several weeks until the new brick road was ready for traffic (Polk 1974:6).

The road became an important means for local residents and businesses to reach area markets. Commercial development was initially focused on logging, which had been one of the most important industries throughout the region as well as in this rural portion of King County. In addition, much of the Snoqualmie Valley offered fertile soils for agriculture, and famers were able to use the road for marketing their produce and dairy products. Chicken farms and horse pastures lined the route (Figure 5). The weight of the logging trucks and farm equipment took a toll on the brick surface, however, and the damage caused by the spiked metal wheels of a large tractor only 2 years after installation could still be seen more than 60 years later (Polk 1974:5–8).

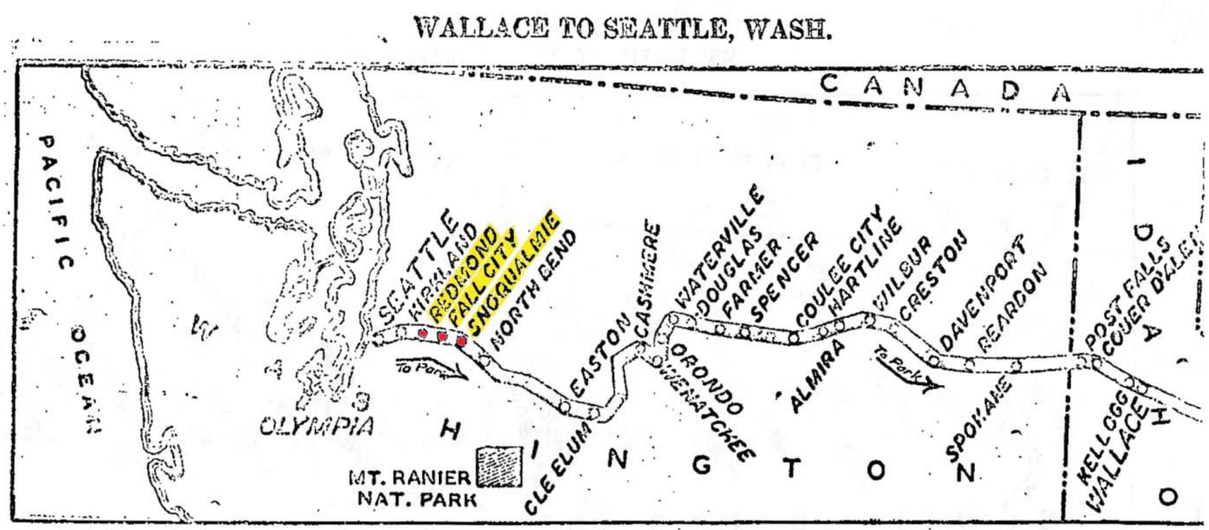
In addition to its local importance, the Red Brick Road (later referred to as the Old Red Brick Road, but officially known as 196th Avenue NE) also became part of larger national transportation networks. It is believed that this segment of roadway was incorporated into the Yellowstone Trail, which ultimately stretched from coast to coast and became a popular tourist route. Pamphlets published by the trail association as late as 1935 showed the route crossing Snoqualmie Pass and then heading through Redmond and on to Seattle. Many route maps are not sufficiently detailed to show the Red Brick Road portion of the trail; however, in later interviews local residents also specifically remember being able to access cross-country transportation routes from the Red Brick Road (Gemperle 1972: nomination supplement 1-2; Yellowstone Trail Association 1935) (Figure 6).

More than 100 years after it was constructed, the Red Brick Road remains in place, continuing to serve as a travel corridor for local residents and commercial interests. Although no longer linked to important regional and national highways, the Red Brick Road continues to evoke important early transportation developments in King County and beyond.

## Historical Reports

The importance of the Red Brick Road is recognized by nominations to the NRHP and the King County Register of Historic Places (KCRHP). The NRHP nomination was originally submitted in December 1972 and then edited and resubmitted in July of 1974. The Keeper of the National Register certified the


Figure 5. The Red Brick Road provided access for local residents, including this funeral procession in the 1920s. Courtesy of the Redmond Historical Society.




Yellowstone Highway Association. 1935. *The Yellowstone Trail. A Good Road from Plymouth Rock to Puget Sound.* Yellowstone Trail Association, Ipswich, South Dakota.

Figure 6. The Yellowstone Trail guides showed the route extending from Snoqualmie and Fall City to Redmond.

inclusion of the Red Brick Road in December of that year. The Landmarks Commission placed the road on the King County Register of Historic Places in 1983. In the nominations for both of these registers, the significance of the Red Brick Road property was evaluated within an historic context, and both provide fairly detailed historical background material to make this assessment. Because of the age of these reports and the increased accessibility of archival documentation, additional contextual research could provide a more comprehensive view of the economic and social implications of the road as well as a more detailed analysis of the construction methods and material choices.

## PREVIOUS INVESTIGATIONS

Several studies have examined the condition of the Red Brick Road through time. Other investigations have included traffic studies and maintenance and repair reports. A selection of these documents used in this report is included in Table 1.

Table 1. Previous Work on Red Brick Road

| AUTHOR | DATE | REPORT NAME OR WORK TYPE |
|---|---|---|
| Haff, Louis J. | 1984 | Report on Resources Required for Maintenance and Repair of Red Brick Road |
| King County Department of Public Works | 1987 | Plans for repairs to 196th Avenue NE (Red Brick Road) (NE Union Hill Road to SR-202) |
| Kramer, Chin & Mayo, Inc. | 1987 | Plans, 196th Avenue Northeast (Red Brick Road) (NE Union Hill Road to SR-202). |
| Cassidy, Jon | 2002 | King County Landmarks and Heritage Commission, Certificate of Appropriateness Application, Red Brick Road (196 Avenue NE) |
| King County Department of Transportation | 2002 | 196th Avenue NE (Red Brick Road): NE Union Hill Rd to SR 202 |
| Birchman, Jesse | 2013 | Gunshy Manor Farm: Existing Red Brick Road Trip Counts and Estimated Future Gunshy Manor Trips on the Red Brick Road. |
| Voss, Didrick | 2013 | Evaluation of Impacts to the Red Brick Road (in Unincorporated King County, Washington) from Expected Vehicle Traffic to and from Future Development of the Gunshy Manor Farm |
| King County Department of Transportation | 2007, 2014 | Annotated Red Brick Road Traffic Data |

### Maintenance and Repair Information

Maintenance and repair records maintained by King County over the last few decades provide information on the changing condition of the Red Brick Road. A memorandum from Louis J. Haff, Maintenance Engineer, dated September 7, 1984, states “No maintenance has been performed on the road since 1972 because the prevailing opinion of maintenance management was that inclusion on the National Historical Register [sic] precluded even routine maintenance by normal means.” As a result, the condition of the road at that time was considered to be extremely poor. There were large areas of heaving, depressions, and settlement as well as numerous surface defects or potholes of missing bricks. Areas of the surface that had been overlaid with asphalt had loosened and were spalling. Recommendations were made for immediate repairs to the existing surface defects, with primary emphasis on the potholes and missing bricks, which were considered a hazard for users. Suggestions for long-term maintenance included placing operating restrictions on the road, such as load and speed limits, and upgrading the surface conditions at a cost estimate of $100,000 to $200,000 (Haff 1984).

As a response to Mr. Haff’s recommendations, the King County Department of Public Works authorized a Feasibility Study for the Red Brick Road in December 1985. The goal was to evaluate the conditions of the road and prepare recommendations for both short- and long-term improvements for complete restoration to its original condition. The firm of Kramer, Chin & Mayo, Inc. (KCM) was awarded the contract to conduct the study, and the final report was completed in June 1986. As part of this project, on-site investigations were performed, including a geotechnical field inventory to determine the condition of the roadway surface materials and underlying subgrade. The distress and deficiency of each element were reviewed with respect to the restoration requirements (KCM 1986; Hong Engineering Associates 1986).

The study indicated that the road had been subjected to considerable damage from traffic and the environmental elements since its original construction. About half of the bricks were broken or destroyed, but very few were missing. Asphalt had been used in many areas for patching the potholes, and the material was losing its bond with the bricks and separating. Due to the unstable conditions of the subgrade and settlement, the road was very rough. Drainage was inadequate or nonexistent for 50 percent of the roadway. A short-term plan to correct the most urgent deficiencies was estimated to cost $519,000. The total overall restoration cost for both the short- and long-term plans was estimated between $1,600,000 and $2,900,000 (KCM 1986).

As a follow-up to their Feasibility Study and recommendations for restoration of the road to its original condition, KCM continued with their engineering services to prepare a set of contract documents for the short-term restoration. Bids were opened on Tuesday, March 22, 1988, and the contract was awarded to Dennis R. Craig, Construction, Inc. in the amount of $590,000. The primary scope of work included removing, replacing, repairing and rehabilitating the brick pavement; removing asphalt; removing, cleaning, and salvaging existing bricks; repairing shoulders; and improving drainage as well as undertaking miscellaneous other work. The completion and acceptance date for the contract was April, 18, 1989.

### Traffic Operations

In October 2002 RSD issued a report based on the findings of a traffic study conducted for the Red Brick Road. The study examined safety issues associated with current and future traffic operations as well as the potential impact of closure of the roadway and made a series of recommendations. In regard to the condition and maintenance of the road, the report indicated that routine maintenance work had not been regularly performed since the restoration contract, as described above, was completed in 1989. The Maintenance Operations Section applied to the King County Landmarks and Heritage Program for a “Certificate of Appropriateness” to conduct suggested maintenance and repairs in September 2002, and they received authorization the following month. The work, which was based on the findings of the 1989 restoration project, included mowing, gravel and concrete shoulder replacement, pothole repair, and other routine road maintenance (King County Department of Transportation 2002; Cassidy 2002).

### Potential Development of Gunshy Manor Farm Property

In November 2013 Pavement Engineers, Inc., completed a report that assessed the effects on the Red Brick Road of the development of the nearby Gunshy Manor Farm property. The report evaluated the impact of increased traffic on the road’s pavement structure and was intended to accompany an application to the King County Landmark’s Commission for a Certificate of Appropriateness. The development was estimated to add 2,162 average annual daily trips on the road. In its conclusion, the report stated that, assuming reasonable maintenance by the County, the road should have another 100 years of structural life left and the additional traffic would not be expected to increase significantly the deterioration of the road’s surface. The report did not define what was considered “reasonable maintenance” (Birchman 2013).

## FIELD METHODOLOGY

The SWCA team, consisting of preservation specialist Eileen Heideman and consulting engineer Robert Krier, conducted a field review that included a visual assessment of the conditions along the entire length of the Red Brick Road. The maps and contract documents that were prepared for the 1988 short-term restoration project were used to identify the stationing of the various roadway features and repairs that were included in that contract. These documents were also used to record the location and inventory of the various elements observed during the visual inspection. The plans show the brick surfacing to begin at Station 0 + 30 and end at Station 61 + 62, for a total of 6,132 lineal feet (KCM 1987).

The field survey began with a reconnaissance-level review of conditions along the length of the road from a vehicle. A pedestrian survey of the road followed. The team walked the length of the road, noting areas of obvious surface-level condition problems such as cracked or loose brick, missing mortar, missing curb sections, and depressions in the road. Photographs were taken of general conditions and areas of concern were marked on the 1987 repair plans.

The team conducted test probes to provide a quick, low-tech method for assessing the sub-base condition. Plans indicate that the brick is 4 inches deep with a 1- to 2-inch sand layer cushion between the brick and the concrete sub-base. The probe consisted of a ¼-inch-diameter pointed steel rod that was driven through cracks in the roadway surface until it encountered resistance or reached the maximum depth of the probe at 15.5 inches (Figure 7). Based on the size of the brick and the amount of sand that plans indicate is between the brick and the sub-base, it was determined that the test probe would terminate at approximately 5 to 6 inches if the sub-base was solid. Test probes were assigned the following condition rankings based on surface condition and depth of probe:

- Rank 1 (poor) – broken/crushed brick, probe goes through sub-base
- Rank 2 (fair) – broken brick, solid sub-base
- Rank 3 (good) – no brick cracking or depressions

Test probes were rarely assigned Rank 3 condition, as sections of the road with bricks in good condition generally did not have cracks or missing mortar that would provide test probe access to the sub-base.

## PUBLIC INTERACTION

During the field review, residents passing by on the road visited with the inspection personnel and provided their comments regarding the importance of preserving the historic road and its surrounding environment and habitat. An information sheet prepared by King County Road Services was handed out to passersby and individuals with questions. This information sheet addressed frequently asked questions, discussed the 4Culture grant that provided funding for the conditions assessment, and provided contact information for King County Road Service’s cultural resources coordinator.

Figure 7. Test probe with Rank 2 conditions.

## RESULTS AND RECOMMENDATIONS

As a result of these field assessments, the SWCA team identified a number of issues that have contributed in varying degrees of severity to the deterioration of the Red Brick Road. Many of these issues are similar to those identified in previous studies, while others appear to be the result of or to have been affected by the 1988 repairs. Two major areas of concern are the condition of the subgrade and sub-base, particularly in the vicinity of the wetlands. Surface crushing and fracturing of the brick is also a problem, as are the surface depressions in the vicinity of monument cases. The locations of the visual survey and test probes are shown on plans in Appendix A, while detailed results are contained in tables located in Appendix B. Note that station measurements are approximate.

Specific recommendations related to the subgrade, sub-base and surface of the road as well as to other environmental conditions that should be assessed are discussed in this section. The development of a Cultural Resource Management Plan (CRMP) is recommended as a next step to address these important issues in more detail and provide guidelines for best practices in ongoing maintenance and future planning for the Red Brick Road.

### Subgrade

A long segment of the Red Brick Road lies within the wetlands referred to as the Evans Creek Flood Basin. This 3,100-foot section of road generally extends from the north of the Evans Creek North Bridge to NE 61st Place in the south. The subgrade (the section of roadway below the concrete sub-base) within this segment of road has been described by previous geotechnical evaluations as being in “poor” condition. SWCA’s visual inspection of the road in this segment showed major cracks, as well as heaving, severe surface settlements, fractures of brick, and sagging, which are all indications of apparent subgrade bearing failure (Figure 8).

Included with the KCM's Conditions Assessment Report of June 1986 was a Geotechnical Engineering Evaluation in an appendix. This report addressed the structural features of the roadway subgrade, particularly within the wetland segment. The most critical areas identified were between Stations 20 and 43 (approximately 0.5 mile in length). The road in this area was described as having a very thin subgrade fill over the soft and wet native soils. Further, the report stated that the severe surface settlement and potholing were likely caused by insufficient thickness of the subgrade layer.

The 1986 report suggested that the best way to achieve proper roadway repair was to remove the existing pavement structure in those segments with a subgrade that did not meet the accepted engineering standards determined by geotechnical testing and evaluations. Depending on the soil conditions at each individual location, recommendations were made to add a crushed rock course to the existing subgrade, topped with a layer of sand and gravel, and then to pour a new concrete sub-base and replace the bricks while preserving the historical structural features. It was stated that repairs made to any segment of the road without providing a proper subgrade would represent a short-term approach to the problem, and the deterioration would continue to occur.

### *Recommendations*

Further deterioration of the sub-base will continue unless the subgrade is rebuilt following the recommendations in the 1986 Geotechnical Report. However, these repairs will require complete reconstruction of the road through these sections, which will, in turn, affect the integrity of the road under the NRHP and KCRHP guidelines. Since it has been nearly 30 years since the previous study, a new geotechnical review may be warranted and may suggest alternative methods to assess and repair or replace the subgrade. All of the ramifications of subgrade replacement and the effects on future uses of the road merit further discussion by King County, the Landmarks Commission, area residents, and other involved parties.

## Concrete Sub-base

In Attachment 9, Figure 2, of the Gunshy Manor report (Birchman 2013), a curve illustrates the “Subgrade Strength Profile.” Only the southerly 700–800 feet of the brick segment is shown as being considered “good,” the northerly 1000 feet is considered “average,” and the remaining 4,000-plus feet of the subgrade is depicted as “poor.” This rating coincides with the observations made by Kevin Kelsey of King County in October 2013 when he responded to the report as follows: “We consider the structural condition of the roadway to be in only fair to poor condition.” Further, “A brief visit to the site revealed the roadway is currently exhibiting a variety of pavement distress types at numerous locations, including sagging, rutting, pavement cracking, and apparent base bearing failure.” It should be recognized that this deterioration has reoccurred in a period of only 26 years since the major 1988 restoration project (Kelsey 2013).

Another comment in this report discusses the road structure. The Executive Summary states that the concrete slab at the bottom of the roadway section is 5 to 6 inches thick and the bricks above it have a depth of 4.0 inches. Further, it is assumed this combination provides a total depth of rigid material of 9 to 10 inches, which is substantially greater than the 200-year design depth of 8.01 inches. These assumptions seem questionable. Testing indicates that there is a 1- to 2-inch layer of sand between the bricks and the concrete slab. Further, the elements are independent from each other, and thus the


Figure 8. Surface settlement showing apparent subgrade bearing failure (note sag in road on left side of photograph).

structural behavior is not acting compositely. As a result, it does not seem reasonable to consider the design depth of rigid material as being substantially greater than 8.01 inches.

No records have been found that provide an indication of the condition of the unreinforced concrete sub-base, or that any major inspections have been performed on that element. This concrete slab performs the same function as other highway pavements in carrying heavy truck loads. However, without removing the bricks, the slab cannot be inspected to observe the possible deterioration that may be taking place. Cracking, particularly alligator cracking, is inevitable in concrete that lacks reinforcing steel. This situation is most likely to occur when the subgrade supporting the slab is inadequate, as has been reported by the geotechnical engineering evaluations conducted for this road. Concrete has a tendency to rise, subside, or tilt as a result of the expansive native soil. It must be recognized this concrete is 100 years old and may not have been of a very high quality by modern standards when it was installed. It could have been affected significantly by thermal expansion or by the many freeze-thaw cycles it experienced, resulting in a major source of deterioration. The 1989 Red Brick Road Restoration Contract Plans call for a total of 18,770 square feet of patching of the brick in various areas, including full widths of the roadway in some locations. Forty-six percent of those areas required a new concrete sub-base and 54 percent required the use of cement grout to level the depressions and settlements of the existing concrete sub-base.

These concerns prompted the SWCA field personnel to check the concrete sub-base by using a probe. Field results and comparison to road plans show that a test probe with normal sub-base conditions would include 4 inches for the depth of the brick and one to two inches for the depth of the original sand cushion for a total of 5 to 6 inches of penetration. From the attached field notes it is seen that out of the 46 test probes, three exceeded 15.5 inches and one was 8.5 inches (Figure 9). All other test probe results were in the normal range.

Test probes were disproportionately placed in areas that were visibly damaged on the surface, such as low spots, cracks, or places with loose or crushed brick, in order to test the sub-base in these locations. Fewer probes were placed in areas where the road surface showed more limited signs of deterioration. This methodology was partially due to a lack of readily available probe locations, such as surface cracks or areas of loose or missing mortar.

The surface of the sub-base itself was examined in one area where a loose brick fragment could be removed and the sand cushion could be moved aside for visual inspection (Test Probe 46) (Figure 10). The sub-base in this location is solid, but soft, with powder-like film occurring on the surface with light scraping. No sub-base cracks were observed.

The roadway “curbs” are not standard curbs as commonly referred to in sidewalk and street configurations. Rather, they are considered edge restraints that are necessary along the sides of the pavement to prevent lateral movement of the bricks and loss of the bedding material on which the bricks are set. Curb construction is an integral part of the concrete sub-base slab, and is approximately level with the top of the bricks. In some areas there are portions that are completely missing (Figure 11). Many areas are covered by vegetation, while other parts of the curb have deteriorated to the point that they are no longer effective as edge restraints.

Figure 9. Test probe showing failure of sub-base.

Figure 10. Test probe 46 with loose brick.

Figure 11. Missing edge restraint segment.

### *Recommendations*

Taking core samples of the concrete slab is recommended to obtain additional information about the quality and strength of the concrete. Additional historical research may also result in a better understanding of concrete composition. Although the results of the test probes are encouraging, they should not be considered a reliable demonstration of the actual condition of the base slab. Where potholes, heaving, cracks, depressions or raised sections are affecting the surface conditions, it is a sign of a structural defect. Bricks and the sand cushion around those areas should be temporarily removed and the concrete slab should be inspected for damage. In order for the road to continue to be used for automobile traffic, the cause of the sub-base damage needs to be identified and addressed, and the sub-base and edge restraints should be rebuilt in these locations.

## Surface

There are many locations where fractures, breaking, and misalignment of the bricks, both vertically and horizontally, occur (Figure 12). These areas still serve as a functional surface along with the adjacent brick pavement, but will eventually need to be replaced. These conditions are similar to those that were repaired in the 1988 renovation. Several methods of repair were used at that time, although not all were successful. One of those methods involved two strips of damaged bricks, each 18 inches wide, that ran nearly the full longitudinal length of the brick pavement. The strips were approximately 10 feet apart and parallel to each other. These strips were identified as the place where a heavy, metal-wheeled steam tractor traveled down the road shortly after it had been built. The wheels left fractured and broken brick, and over the years the heavy trucks and speeding traffic continued to aggravate the condition (Figure 13). The joints between the broken and fractured bricks were cleaned to make spaces that were filled with cement grout flush with the top of the bricks. However, the broken fragments and fractured pieces of bricks were not removed. This process did not maintain the original integrity of the brick construction, particularly the joints between the bricks and the retention of the fractured and broken pieces. The historic appearance was compromised, and future repairs should not be made using this procedure.

Depressions and severe pot holes were noted in the vicinity of several monument cases (Figure 14). Similar issues were noted in the 1988 repairs; these cases and covers were adjusted to grade in that contract.

Severe cracks and differential settlement were also noted at the joints between the original 1913 construction and the areas repaired in the 1988 construction. These repairs utilized replacement bricks that likely had different strength ratings and in some cases were larger than the original bricks. Mortar used in these repairs may be harder than the brick, causing failure through the brick itself rather than at the mortar joints. Both of these issues may have contributed to the cracking.

### *Recommendations*

Although many areas of crushed brick are relatively stable, damaged bricks will eventually need to be replaced in kind. Areas with loose or fractured brick should be repaired with bricks salvaged from Union Hill Road, which appears to be the same type of brick used for the original wear surface on the Red Brick Road. When repairing or replacing brick the use of mortar that is harder than the brick should be avoided, as this situation will lead to further brick damage.

Monument cases with sagging and depressions in the immediate vicinity will need to be reset at grade in a similar manner to the 1988 repairs.

Figure 12. Road segment with fractured brick.

Figure 13. Parallel tracks with crushed and fragmented brick.

Figure 14. Sagging in vicinity of monument case.

## Additional Recommendations

For long-term restoration of the Red Brick Road, it is important to give proper consideration to the impact from environmental elements and the subgrade native soils, as well as the impact from live loads. It is apparent that conditions such as swelling, heaving, and depressions will continually cause cracking and deformation of the roadway surface and the concrete sub-base. This deterioration will occur without any live loads, but trucks that are in excess of the posted weight limit are undoubtedly contributing to this damage. The speed limit on the Red Brick Road is 25 miles per hour and the load limit for the road is posted at 5 tons. While this weight would probably not cause any significant deterioration to the road's surface, it is questionable how rigidly the limit is enforced. Further, it is necessary to exceed the 5-ton limit to accommodate ordinary service vehicles, such as waste disposal trucks, school buses, and heavy emergency vehicles. No information has been found to identify the damage that is being caused to the unreinforced concrete sub-base by these heavier loads. During the field review both the speed limit and load limit of vehicles were observed to be in excess of the posted limits. Field tests with loaded vehicles are recommended to assess the maximum limitations for vehicle weight and speed. The current load and speed restrictions should be maintained until the results of the field tests are available. Further data needs to be gathered to identify the source or sources of the problems prior to any extensive repair work on the road. This recommendation does not preclude emergency repairs of potholes with loose bricks or other similar problems.

A cyclical maintenance plan should be developed for the Red Brick Road. This plan should outline annual or semi-annual maintenance and provide direction on how repairs should take place. Repairs should follow the Secretary of the Interior's Standards for the Treatment of Historic Properties, with emphasis on the Standards for Rehabilitation (Appendix D). Bricks that were salvaged from the Union Hill Road project and are stored on pallets (Appendix C) should be used for repair whenever possible, as these bricks most closely match the type originally used on the Red Brick Road. The maintenance plan should also address annual removal of vegetation in and around the road (Figure 15). Removal methods should be non-intrusive and non-destructive. Assigning a trained maintenance crew of two to three people may help to ensure that the maintenance plan is being followed when repairs are conducted.

A further step in evaluating the foregoing recommendations for the Red Brick Road and providing a means to implement them is to develop a Cultural Resource Management Plan (CRMP). The CRMP would provide a more detailed examination of the Red Brick Road as a historic resource and develop both operational and preservation goals for future management. This document would be an important planning tool that would address best practices in the restoration as well as ongoing maintenance of the road.

Figure 15. Vegetation in road.

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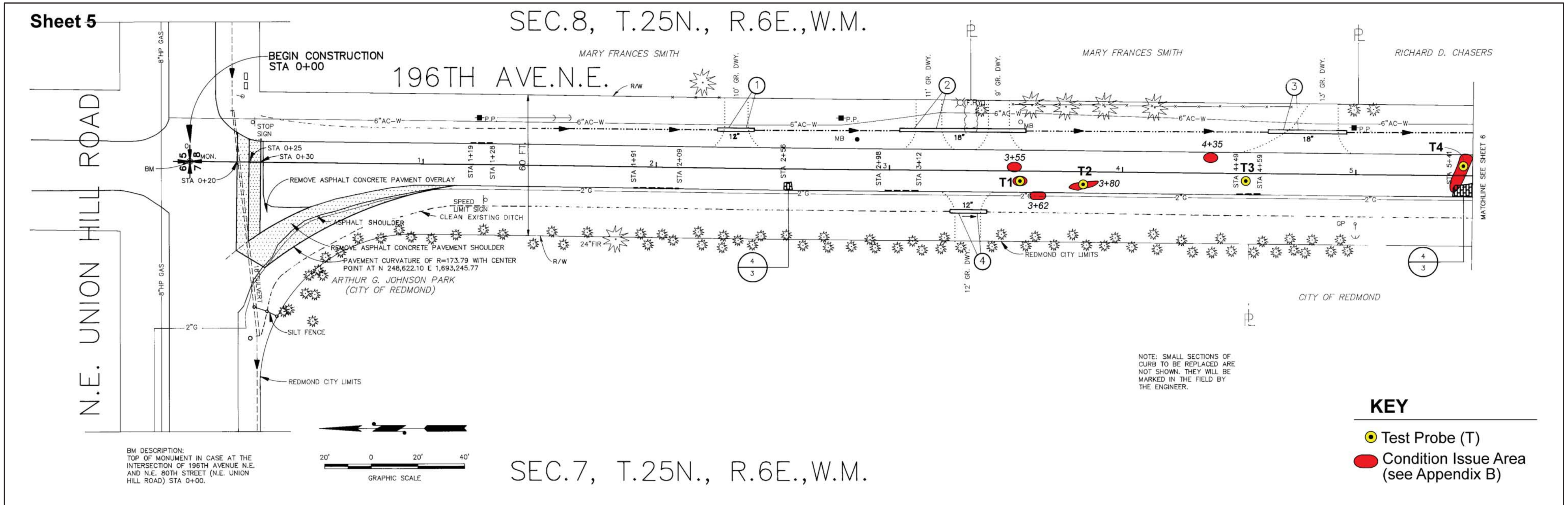
# APPENDIX A: 1987 REPAIR PLANS AND 2015 CONDITIONS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MARY FRANCES SMITH
RICHARD D. CHASERS
ARTHUR G. JOHNSON PARK (CITY OF REDMOND)
CITY OF REDMOND
T1
T2
T3
T4
3+55
3+62
3+80
4+35
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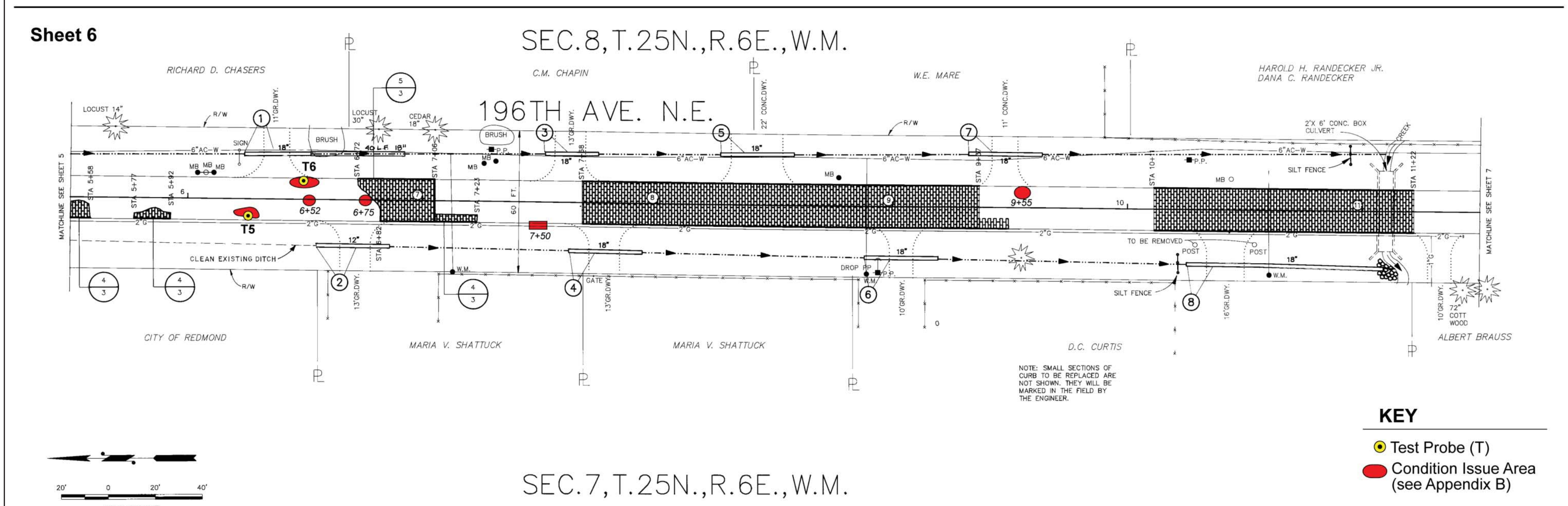
GRAPHIC SCALE
SEC.7, T.25N., R.6E.,W.M.
KEY
Test Probe (T)
Condition Issue Area (see Appendix B)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196TH AVE. N.E.
RICHARD D. CHASERS
C.M. CHAPIN
W.E. MARE
HAROLD H. RANDECKER JR.
DANA C. RANDECKER
CITY OF REDMOND
MARIA V. SHATTUCK
MARIA V. SHATTUCK
D.C. CURTIS
ALBERT BRAUSS
T5
T6
6+52
6+75
7+50
9+55
NOTE: SMALL SECTIONS OF CURB TO BE REPLACED ARE NOT SHOWN. THEY WILL BE MARKED IN THE FIELD BY THE ENGINEER.
GRAPHIC SCALE
SEC.7,T.25N.,R.6E.,W.M.
KEY
Test Probe (T)
Condition Issue Area (see Appendix B)

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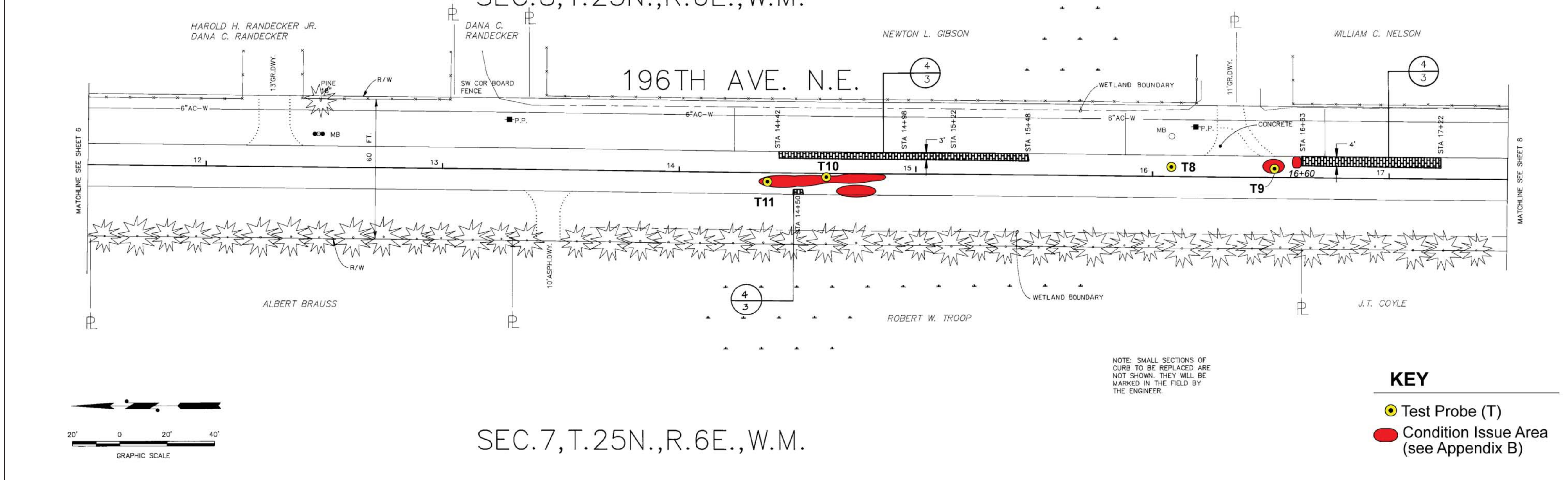


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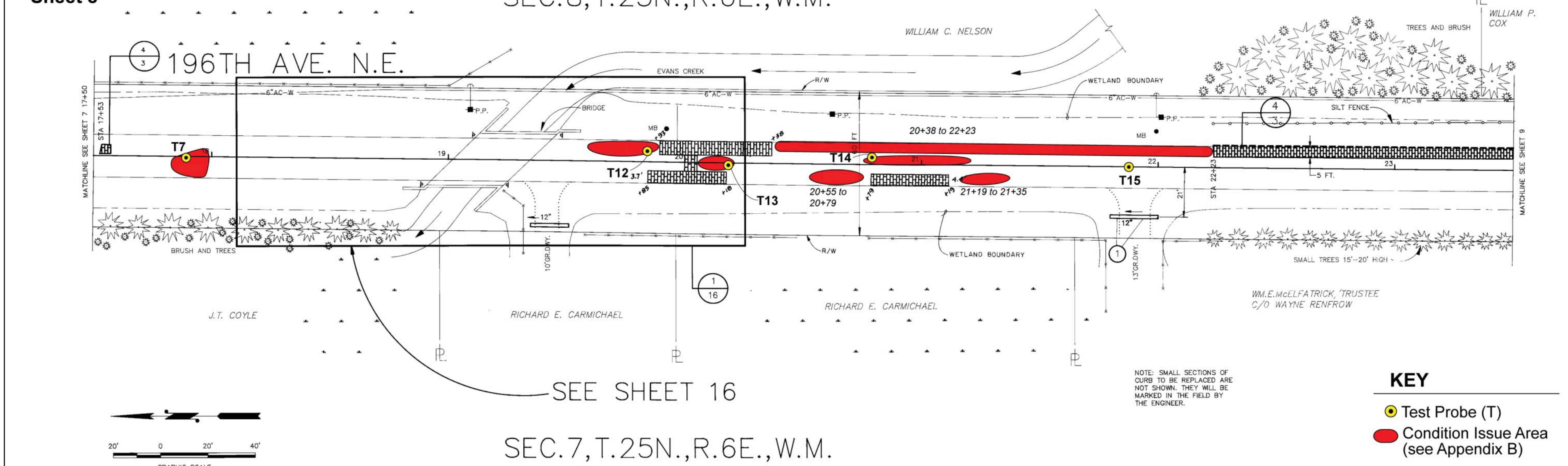

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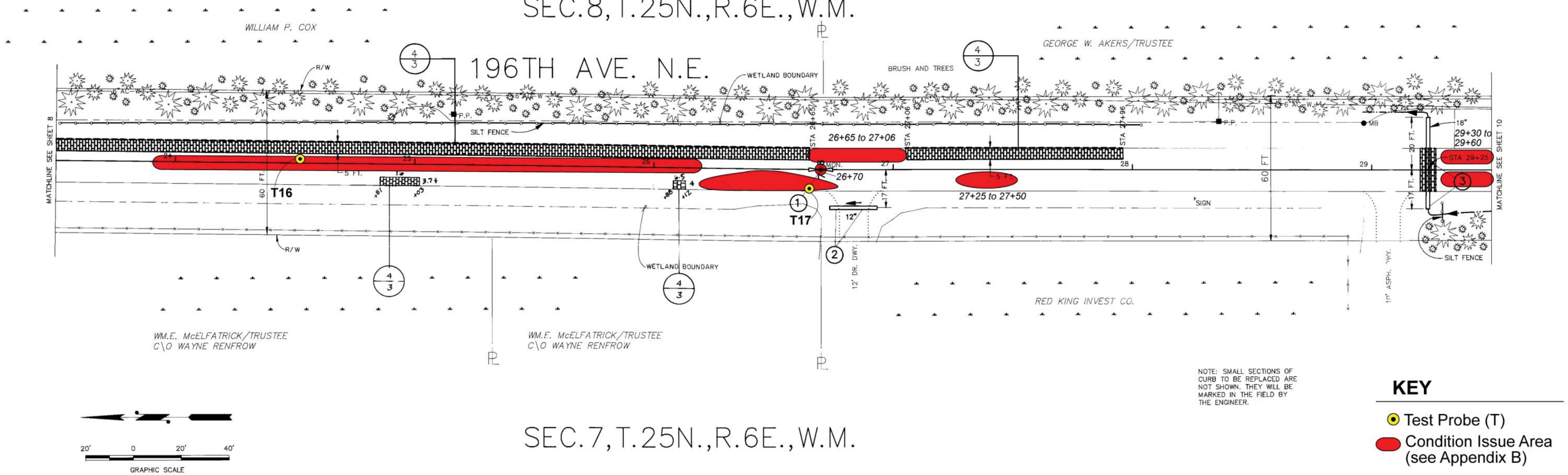


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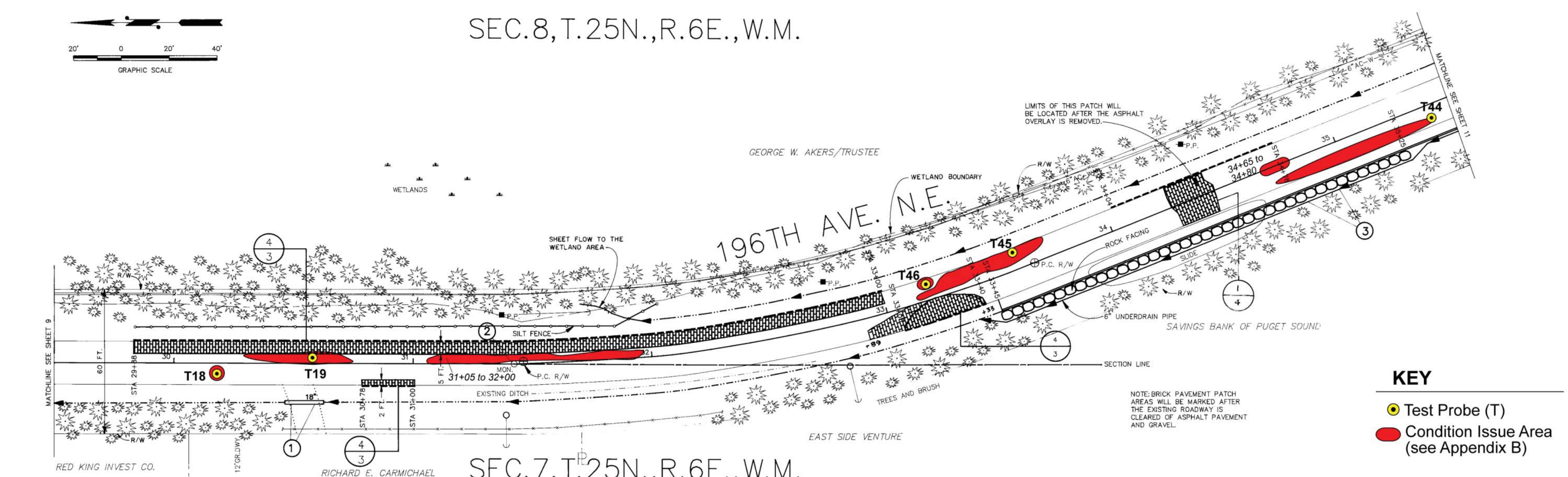

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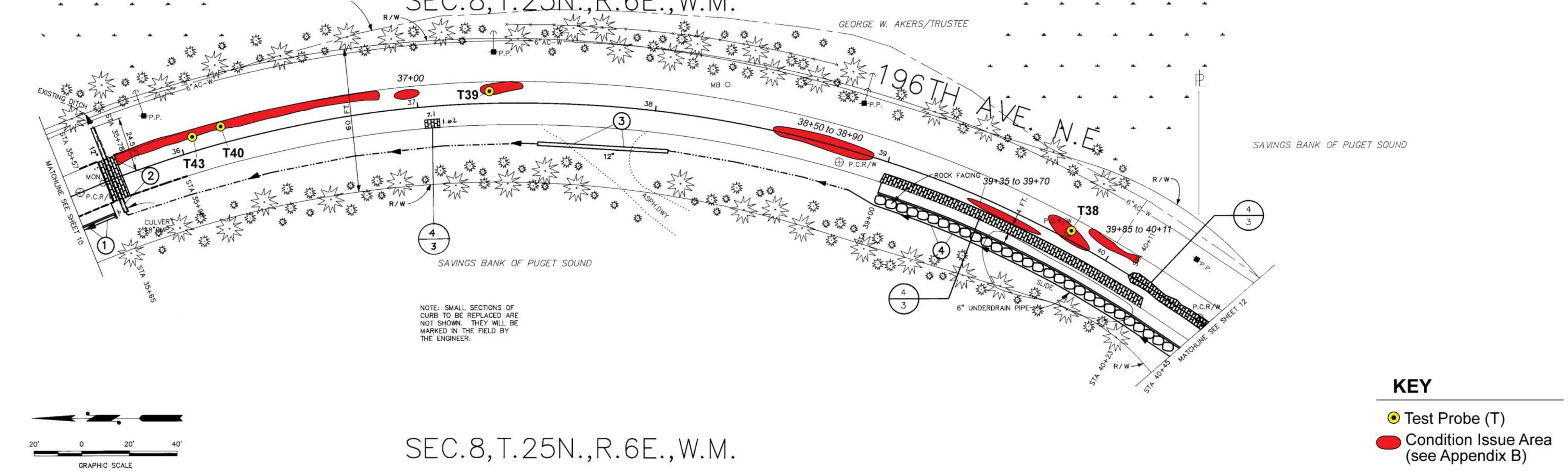


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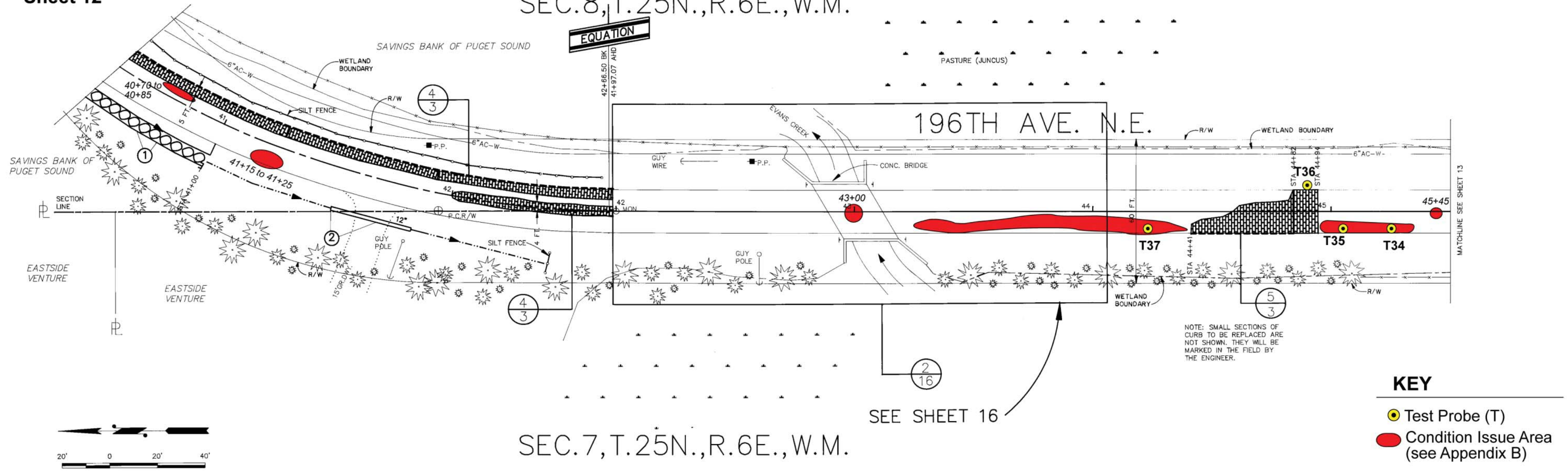

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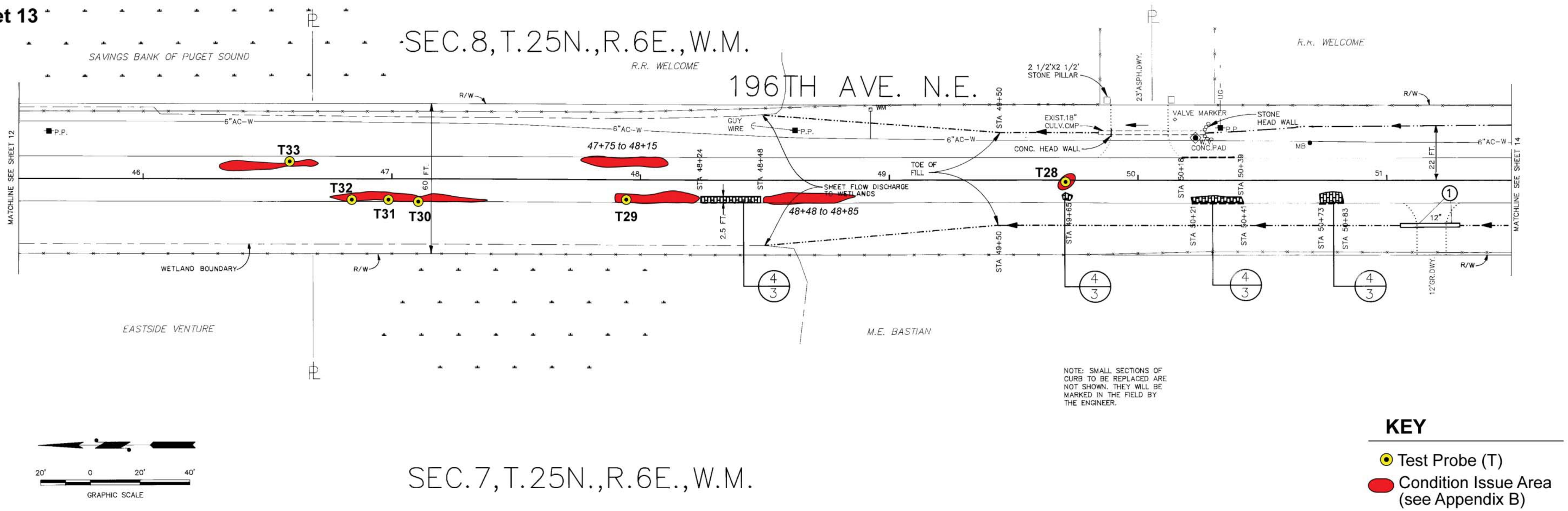


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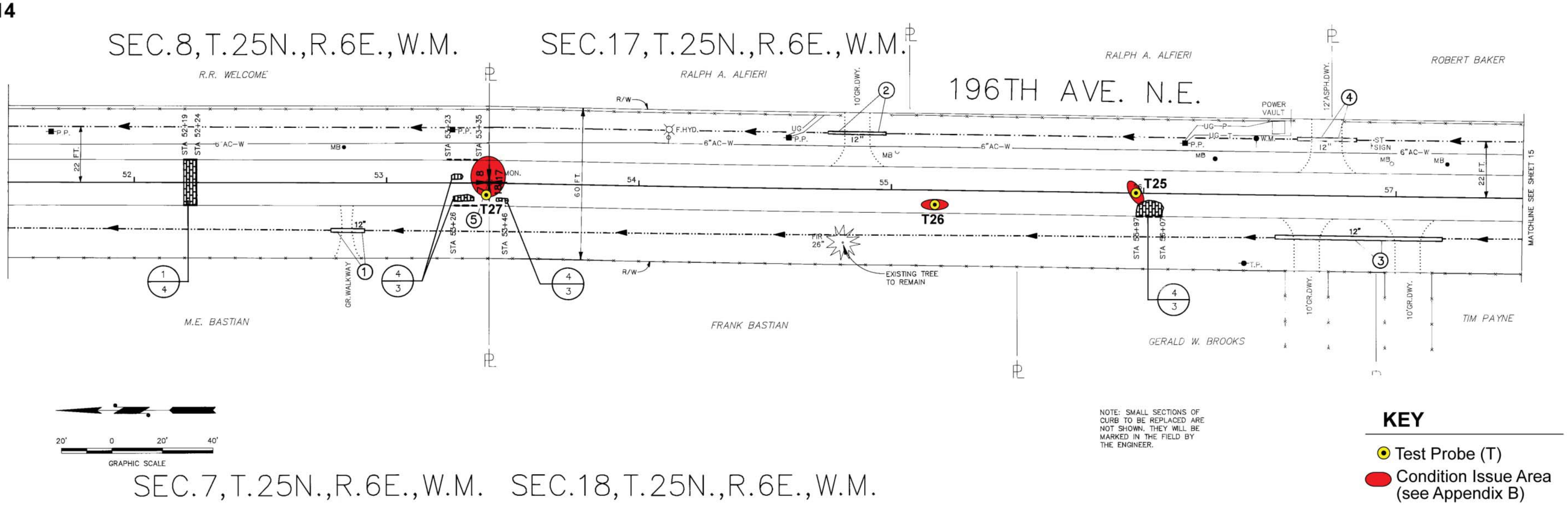

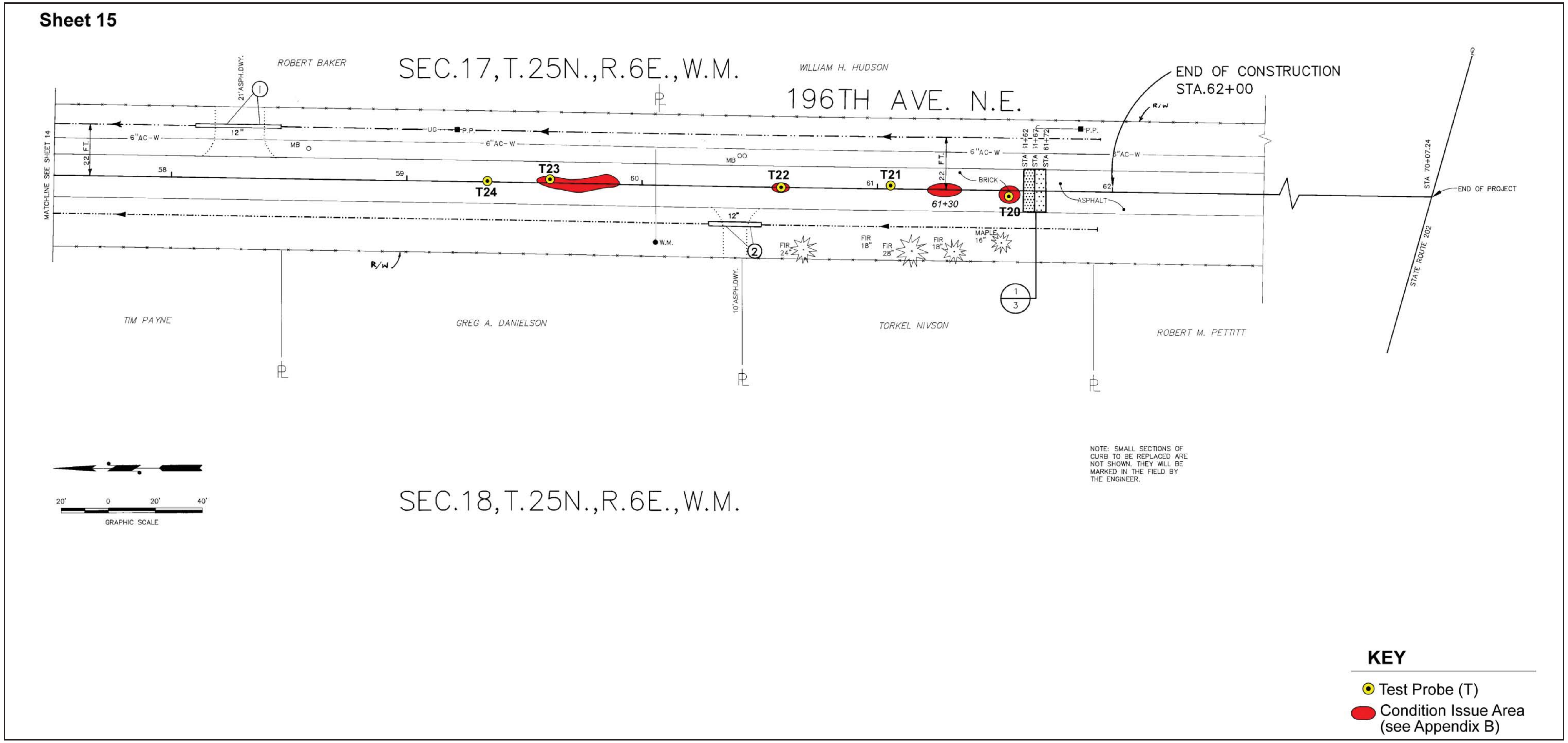

Sheet 15
ROBERT BAKER
SEC.17,T.25N.,R.6E.,W.M.
WILLIAM H. HUDSON
196TH AVE. N.E.
END OF CONSTRUCTION
STA.62+00
T24
T23
T22
T21
T20
61+30
BRICK
ASPHALT
END OF PROJECT
STATE ROUTE 202
STA 70+07.24
MATCHLINE SEE SHEET 14
TIM PAYNE
GREG A. DANIELSON
TORKEL NIVSON
ROBERT M. PETTITT
NOTE: SMALL SECTIONS OF CURB TO BE REPLACED ARE NOT SHOWN. THEY WILL BE MARKED IN THE FIELD BY THE ENGINEER.
GRAPHIC SCALE
SEC.18,T.25N.,R.6E.,W.M.
KEY
Test Probe (T)
Condition Issue Area (see Appendix B)

# APPENDIX B: TEST PROBE TABLE

Table B-1. Results of Conditions Overview (see Appendix A for locations)

| STATION* | TEST PROBE | TEST PROBE RESULT (depth in inches) | CONDITION RANK | DESCRIPTION | NOTES |
|---|---|---|---|---|---|
| 3+55 | | | | Low spot east of centerline | |
| 3+58 | T1 | 4.5 | 2 | Low spot west of centerline | Test probe hit sub-base. |
| 3+62 | | | | 3’ missing curb on west side of road | |
| 3+80 | T2 | 4.5 | 2 | Longitudinal low spot on west side of road | Test probe hit sub-base. |
| 4+35 | | | | Low spot on east side of road | |
| 4+55 | T3 | 4.5 | 2 | Low spot west of centerline | Test probe hit sub-base. |
| 4+45 | T4 | 5.5 | 2 | Transverse low spot, full width of road | Test probe hit sub-base. |
| 6+25 | T5 | 4.5 | 2 | Longitudinal low spot west of centerline | Test probe hit sub-base. |
| 6+50 | T6 | 4.5 | 2 | Longitudinal low spot on east side of road | Test probe hit sub-base. |
| 6+52 | | | | Low spot at centerline | Loose brick |
| 6+75 | | | | Low spot at centerline | |
| 7+50 | | | | 3’ missing curb | |
| 9+55 | | | | Low spot on east side of road | |
| 14+30 to 14+90 | T10<br>T11 | 5<br>5 | 2<br>2 | Longitudinal low spot west of and on centerline | Test probe hit sub-base. |
| 16+10 | T8 | 5.5 | 2 to 3 | | Test probe hit sub-base. |
| 16+50 | T9 | 5.5 | 2 | Low spot east of centerline | Test probe hit sub-base. |
| 16+60 | | | | Cracking brick | |
| 17+90 | T7 | 5.5 | 2 | Low spots on center line and on the west side of the road | Test probe hit sub-base. |
| 19+60 to 19+93 | T12 | 5.5 | 2 | Longitudinal low spot on east side of road. | Test probe hit sub-base. |
| 20+5 to 20+20 | T13 | 5 | 2 | Low spot on centerline | No mortar, test probe hit sub-base. |
| 20+38 to 22+23 | | | | Longitudinal low spot on east side of road | |
| 20+55 to 20+79 | | | | Longitudinal low spot on west side of road | |
| 20+75 to 21+20 | T14 | 5.5 | 2 | Longitudinal low spot east of centerline | Test probe hit sub-base. |
| 21+19 to 21+35 | | | | Longitudinal low spot on west side of road | |
| 21+85 | T15 | 5.5 | 2 to 3 | | Test probe hit sub-base. |
| 23+90 to 26+20 | T16 | 5 | 2 | Longitudinal low spot at centerline | Loose and broken brick, test probe hit sub-base. |
| 26+20 to 26+65 | T17 | 5.5 | 2 | Longitudinal low spot on west side of road. | Test probe hit sub-base. |
| 26+65 to 27+06 | | | | Longitudinal low spot on east side of road | |
| 26+70 | | | | Low around monument case | |
| 27+25 to 27+50 | | | | Longitudinal low spot on west side of road | |

Table B-1. Results of Conditions Overview (see Appendix A for locations)

| STATION* | TEST PROBE | TEST PROBE RESULT (depth in inches) | CONDITION RANK | DESCRIPTION | NOTES |
|---|---|---|---|---|---|
| 29+30 to 29+60 | | | | Longitudinal low spots on east and west sides of road | |
| 30+20 | T18 | 5.5 | 2 | Small low spot west of centerline | Test probe hit sub-base. |
| 30+30 to 30+75 | T19 | 5.5 | 2 | Longitudinal low spot east of centerline | Cracked and settling brick, test probe hit sub-base |
| 31+5 to 32+00 | | | | Longitudinal low spot east of centerline | Cracked and settling brick |
| 33+15 to 33+75 | T45 | 5 | 2 | Longitudinal low spot on east side of road | Some areas of missing mortar, test probe hit sub-base |
| 33+20 | T46 | 5.5 | 2 | Small low spot on east side of road | 2 inches deep, 42 inches by 60 inches, test probe hit sub-base |
| 34+65 to 34+80 | | | | Low spot on centerline | 36 inches by 36 inches |
| 34+70 to 35+40 | T44 | 4 | 2 | Low spot on west side of road | |
| 35+78 to 36+80 | T40<br>T43 | 8.5<br>5 | 1 to 2<br>2 | Low spot on east side of road | Crack at north end of low spot |
| 37+00 | | | | Low spot on east side of road | |
| 37+20 to 35+35 | T39 | 5 | 2 | Low spot on east side of road | Test probe hit sub-base |
| 38+50 to 38+90 | | | | Longitudinal low spot at centerline | |
| 39+35 to 39+70 | | | | Longitudinal low spot west of centerline | Some bricks missing |
| 39+70 to 39+90 | T38 | 5.5 | 2 | Longitudinal low spot east of centerline | |
| 39+85 to 40+11 | | | | Longitudinal low spot on east side of road | Cracked |
| 40+70 to 40+85 | | | | Longitudinal low spot east of centerline | Cracks |
| 41+15 to 41+25 | | | | Low spot on west side of road | Curb dips |
| 43+00 | | | | Slightly low spot at centerline, center of bridge | Cracked, crushed and loose brick |
| 43+25 to 44+41 | T37 | 5.5 | 2 | Longitudinal low spot on west side of road | Cracked in places, test probe hit sub-base |
| 44+90 | T36 | 6 | 2 to 3 | | Test probe hit sub-base |
| 44+94 to 45+35 | T34<br>T35 | 5.5<br>15.5+ | 2<br>1 | Longitudinal low spot on west side of road | Loose bricks, cracked. T35 measured to depth of handle. |
| 45+45 | | | | Small area at centerline | Missing bricks |
| 46+30 to 46+70 | T33 | 5.5 | 2 | Longitudinal low spot on east side of road | Cracked, test probe hit sub-base |
| 46+75 to 47+40 | T32<br>T31<br>T30 | 15.5+<br>5<br>15.5+ | 1<br>2<br>1 | Longitudinal low spot on west side of road | Cracked. T32 and T30 measured to depth of handle. |

Table B-1. Results of Conditions Overview (see Appendix A for locations)

| STATION* | TEST PROBE | TEST PROBE RESULT (depth in inches) | CONDITION RANK | DESCRIPTION | NOTES |
|---|---|---|---|---|---|
| 47+75 to 48+15 | | | | Longitudinal low spot on east side of road | |
| 47+85 to 48+24 | T29 | 5.5 | 2 | Longitudinal low spot on west side of road | Cracked, test probe hit sub-base |
| 48+48 to 48+85 | | | | Longitudinal low spot on west side of road | |
| 49+70 | T28 | 5 | 2 | Small low spot at centerline | Bricks broken, missing, test probe hit sub-base |
| 53+35 | T27 | 5.5 | 2 | Low spot at centerline | At monument case. Several repairs in vicinity, mortar missing and broken, test probe hit sub-base |
| 55+15 | T26 | 5 | 2 | Small low area on west side of road | Test probe hit sub-base |
| 55+90 to 56+00 | T25 | 5 | 2 | Low area across centerline | Test probe hit sub-base |
| 59+35 | T24 | 5.5 | 2 to 3 | | Test probe hit sub-base |
| 59+60 to 59+90 | T23 | 4.5 | | Longitudinal low spot at center line | ½ inch deep, measures 40 inches by 24 inches, test probe hit sub-base |
| 60+55 | T22 | N/A | 2 | Low spot at centerline | 2 inches deep, 32 inches by 36 inches. Could not attain sufficient depth on probe to test sub-base. |
| 61+10 | T21 | 5 | 2 to 3 | | Test probe hit sub-base |
| 61+30 | | | | Low spot at centerline | 1 ¼ inches deep, 24 inches by 24 inches |
| 61+60 | T20 | 4 | 2 | Low spot at centerline | |

* “Stations” refers to stations on 1987 plans (Appendix A)

# APPENDIX C: CADMAN SITE BRICK INVENTORY

Bricks available for future installation on the road are located in the King County Redmond Maintenance Yard (the Cadman Site), on Union Hill Road, adjacent to the Red Brick Road (Table C-1.) Bricks are stored in two areas at the Cadman Site: in a bin and a stack of pallets. The bin contains approximately 6900 bricks, which include a mix of several sizes and types. Most of these are 8 ¾ inches long, but a few measure 8 ½ inches long. These bricks have not been previously used, and may have been purchased for the 1988 repair work. Some of these bricks have a combed or raked surface and no lugs. The bricks stored on pallets were salvaged from the Union Hill Road project and appear to be the same type of bricks as those used in the original construction of the Red Brick Road. There are approximately 36,000 of these bricks. Lugs are located on one side for spacing with sand or grout, and the bricks have a "wavy" appearance from the brickmaking process. Sizes vary slightly, but most appear to be the same type. These bricks are generally clean and ready for use, but a few will need minor touch-up.

Table C-1. Cadman Site Brick Inventory

| LOCATION | BRICK TYPE | SIZE (inches) | NUMBER (approximate) |
|---|---|---|---|
| Bin | Plain, no lugs | 8 ¾ × 2 3/8 × 4 | 6900 |
| | Extruded, combed on end and side | 8 ¾ × 2 ½ × 4 | |
| | Plain, no lugs, impression from drying on boards | 8 ¾ × 2 ½ × 4 | |
| | Lugs, impression from drying on boards | 8 ½ × 2 ½ × 4 | |
| Pallets | Plain, lugs on side, impression from drying on side or kiln | 8 ½ × 2 ½ × 3 ½ | 36,000 |
| | Plain, lugs on side, impression from drying on side or kiln | 8 ¾ × 2 ½ × 3 ¾ | |
| | Plain, lugs on side, impression from drying on side or kiln | 8 ¾ × 2 ½ × 3 ½ | |

# APPENDIX D: SECRETARY OF THE INTERIOR'S STANDARDS FOR THE TREATMENT OF HISTORIC PROPERTIES: STANDARDS FOR REHABILITATION

Standards for Rehabilitation

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Further information is available at http://www.nps.gov/tps/standards.htm.