THESIS

Extension and Improvements of Washington and Lee University
Campus, Lexington, Virginia.

By

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For the Degree of Bachelor of Science in Civil Engineering.

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B I B L I O G R A P H Y

Municipal Engineering Practice - Folwell.

Sewerage - Folwell.

Construction of Roads and Pavements- Agg.

Plain and Reinforced Concrete - Taylor and Thompson.

Handbook of Cost Data- Gillette.

Blanchard's Manual.

INTRODUCTION

The extensions and developments of Washington and Lee Campus discussed in this thesis are considered by the authors as necessary and important to properly open and prepare the way for the future University. The University in its present bounds and the property purchased for extension is accessible from only one side. The only streets by which entrance is possible are poorly constructed and badly designed giving an unfavorable impression before the Campus proper is reached. For a Campus so beautiful to have an approach so unattractive seems most inconsistent.

The Campus of Washington and Lee is not only the property of the greatest University in the South but is a historic spot containing the Tomb of Lee visited each year by hundreds of tourists. It seems most imperative that properly constructed approaches be made to a place so historically significant and so frequented by visitors from every section of the country. We, therefore, propose the changes in the road to the Memorial Chapel, Jefferson, Washington and University Streets, making them attractive and well designed from the engineer's point of view. In making these improvements we feel that they are not only adequate for present proposed development but will best accomodate urgent future circumstances involving more far reaching expansion.

The improvement of University Street will give a view of the Memorial Gate and Campus from Main Street

which is to be the line of the Lee Highway through Lexington.
The moving of undesirable structures along Jefferson Street
will improve the appearance of the Campus surroundings, open-
ing the Campus to a wider and more distinct view. Improve-
ments in street grades and properly designed street inter-
sections will make the approach to the Campus attractive
and easily accessible to visiting tourists. The wall along
Jefferson Street will separate the college proper from the
fraternity and rooming houses making the University buildings
themselves more prominent and imposing.

The estimate of cost herein contained is based
on present prices. We feel that the entire cost of the pro-
ject is within reasonable limits compared to improvement
and necessity of such work to the University. Such improve-
ments will beautify this section of Lexington and it is
thought that this city will cooperate in meeting the expense.

IMPROVEMENT OF UNIVERSITY STREET

The following improvements are to be made:

1. Grade the street as shown on the profile.

2. Construct curbs and pave with bituminous concrete.

3. Make street of uniform width.

4. Construct side walks.

5. Demolish the house now occupied by Dr. Desha.

(1)   The object of grading University Street as shown
on profile is (1) to make visible from Main Street the
Memorial Gate, which is the only road entrance to the
Campus and Lee's Tomb, (2) to improve the grade for traffic.

Main Street carries the tourist traffic and is
the only entrance to Lexington from county roads. With a
hump in University Street such as shown on the profile, it
is impossible for persons traveling on Main Street to ob-
tain a view of the Campus entrance through the Memorial
Gate. Without this improvement, the authors believe that
the artistic effect of the Gate is nullified.

It is proposed to make the improvement in the
following manner (See profile). From a point A, 4 1/2 feet
above the center of Main Street, at intersection of Main
and University Streets, make a clear line of sight to
the base of the Gate. This line of sight intersects the
present surface of University Street at a point B and shows
the amount of cut necessary along the center line. The
maximum cut is three feet and the average cut for the entire
block approxiamtely one foot. This includes excavation for

new pavement. The cut is shown by sections on profile sheet and the entire excavation calculated by End Areas is 978 cu. yards. The material excavated is used as fill on the road through Campus (See page 30). The grade of University Street so constructed will be 4 1/2% from curb line of Jefferson Street to point B (See profile), and from B to center line of Main Street 2 1/2%. These grades are less than at present and being uniform will give the street a good appearance and make it much more desirable for traffic.

(2)   A section through street as proposed is shown in figure (10). It is 30 feet between curbs and four foot concrete walks are laid on both sides against property lines leaving a space of two feet between outer edge of walk and face of curb. The curbs are of the combined curb and gutter type shown in fig. (17). Two courses are used, 1 : 2 1/2 : 5 for base and 1 : 1 1/2 : 2 1/4 concrete for the wearing coat. The space between curb and walk is planted with small shade trees, such as Norway Maple, at intervals of 35 feet.

The pavement is to be bituminous concrete with crushed stone base. The base 8" in thickness with a top covering of 4" of rock asphalt.

(3)   It would be very desirable to make University Street 50 feet wide instead of 42 feet but as it is only about 250 feet in length and will be a residence street in the future the following plan will meet the demands. To widen the street to 50 feet would necessitate tearing

down a brick structure at the corner of Main and University Streets and the improvement would not warrant the cost at present. Such improvement, however, would greatly beautify the future Campus of Washington and Lee and is recommended.

The widening to 50 feet as proposed involves little more than a straightening of the property line on the West side of the street and in no place exceeds 1 1/2 feet. This additional width is easily obtained as the brick building on the corner, now used as a dance hall, is set back 6 1/2 feet from the present property line.

(4)   The side walks are of concrete 4 feet in width, of two course concrete of same proportions as gutters and curbs. A thickness of 4 inches of concrete laid on an 8 inch foundation of broken limestone is used.

(5)   The house now occupied by Dr. Desha on corner of Jefferson and University Streets is to be torn down. This is thought advisable for the following reasons:

(a) A building so close to the street line makes this a dangerous corner for traffic.

(b) The building is old and would not be of much value if moved.

(c) The lower story of the house is constructed of masonry not capable of being moved.

(d) A house of such poor appearance is not desired in the immediate vicinity of the new rooming houses to be constructed by the University along Jefferson Street.

In addition to the improvements above it is suggested that the bank along the west side of University Street be terraced uniformly. This, however, is not dis-

cussed because no figures have been obtained on the earth-work involved. Aside from adding to the beauty of the street it is desiarble to do this grading in order to get material needed in the fill on Jefferson Street discussed under "Improvement of Jefferson Street".
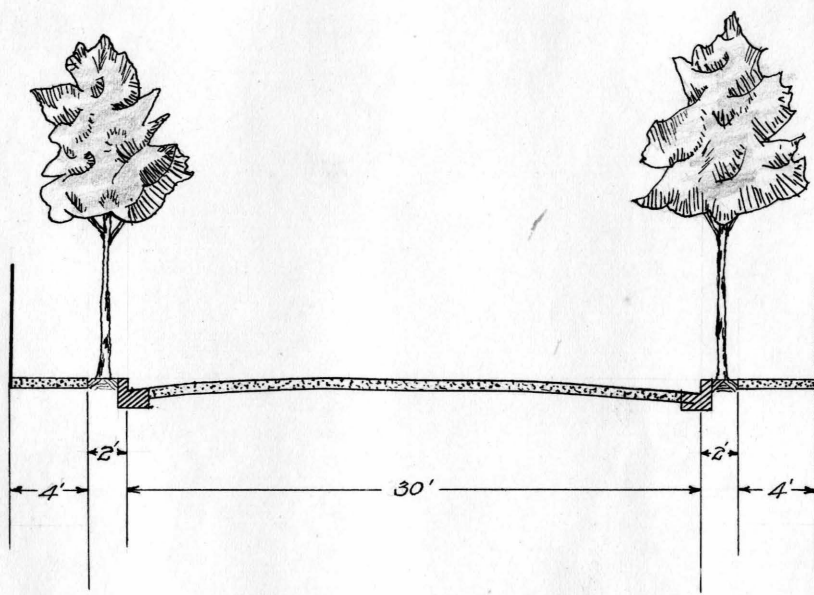
SECTION SHOWING UNIVERSITY STREET

INTERSECTION DESIGN - JEFFERSON AND UNIVERSITY STREETS

(See Map)

This intersection is designed to make Jefferson Street practically a thoroughfare on a 4% grade, the only variation being caused by the road from Lee's Tomb. This road which is a continuation of University Street enters Jefferson Street on a 2.1% grade which is continued to the center of intersection. This gives a rise of 0.34 foot in crown elevation from the center line to the curb line on the south side of Jefferson Street which could not be noticed by traffic. From the center line to the curb on the south side of Jefferson Street the crown is level. From the south curb line University Street in direction of Main Street is on 4 1/2% grade. (See profile).

This design gives the best and smoothest intersection for traffic turning in any direction and the gutters have sufficient grade to properly care for the surface water.

The walks slope toward the curbs 1/4" to 1 foot except in immediate vicinity of the corner where the above requirements interfere. The elevations on the property line are thus calculated to give the best possible grade to the walk and at the same time properly dispose of the surface water.

Water reaching this intersection is disposed of by two catch basins as shown on (Map of Intersection Design) at B and C. These catch basins are to be preferably of the Philadelphia type the specifications of which

are shown in Sewage - by Folwell. The water from B is carried
directly into stormwater sewer which follows north side of
Jefferson Street. Water from C is carried directly across
Jefferson Street by a 12 inch tile to the same sewer.

The curbs on all sides are turned with a 9 foot
radius which gives ample turning space for traffic. A
combination curb and gutter is used constructed of two
course concrete of the following proportions : topcourse
1: 1 1/2 : 2 1/4; top base 1: 2 1/2 : 5. The edges of
the curb are protected by special bar shown in Fig. (17).

From the outer wings of the Memorial Gate to the
curb of University Street and in line with property line
an iron fence 2 feet in height is placed. (See map). This
gives a gross plot 11 x 22 feet approximately enclosed
by the wings of the Gate which will greatly improve the
appearance of this Campus entrance.

IMPROVEMENT OF JEFFERSON STREET

The improvements to be made in Jefferson Street are as follows:

(1) Grade Street as shown on profile.

(2) Widen Street and make width uniform.

(3) Demolish buildings on south side of street from Washington Street.

(4) Construct curbs and pave with Bituminous Concrete.

(5) Construct side walks on each side.

(1)   Since Washington Street has been raised by a vertical curve at Jefferson Street it becomes necessary to change the grade of Jefferson Street. This street is also very narrow and to adequately accomodate the future increased traffic it should be made wider and beautified as it will be the most prominent part of the town when the extension of the University is completed. Dormitories and fraternity houses will be built on this street and automobiles coming into Lexington will use Jefferson Street turning in at its intersection with Main Street. This corner will be changed as shown on the map of Proposed Extensions and discussed later in the thesis.

We propose that Jefferson Street be run on a grade as nearly uniform as possible from the upper side of Washington Street to the intersection of Jefferson and Main Streets at the Blue Hotel, or East Dormitory.

Since the intersection of Jefferson Street and Washington Street has been designed with Jefferson Street having a grade of 5 per cent. on each side of Washington Street, this will be the grade of the new street for the first

one hundred feet, and from this point down to the inter-
section at Washington Street the grade will be 4 per cent.
The same grade will be maintained the remaining distance
from University Street down to Main Street.

This new grade and elevation of one end of
Jefferson Street will cause considerable fill as shown by the
profile and cross section of the new street. The fill from
the method of end areas is found to 2151 cubic yards.

(2 and 3)   In making the street wider it is proposed that
all of the widening be done on the south side, that is, the
side opposite the Campus boundary. This will cause a slight
amount of excavation due to the rise on that side of the
street and also the buildings on that side will have to be
removed or torn down. These buildings are all practically
valueless and their condition is such that they could not
well be moved. Therefore, we propose that they be torn down.
These buildings are as follows: the brick and frame building
on the corner of Washington and Jefferson Street, now used
as display room for Finchley and Co., an old house and barn
just back of this building, the house on the corner now oc-
cupied by Dr. Desha, and two old frame buildings, one un-
occupied and the other used as a pressing shop.

In widening the street it is proposed that the
new width be 50 feet including the side walks, this width to
be the same for the entire length of the street. At its inter-
section with Main Street the curbs should curve as shown on
the map, this causing the porch of the Blue Hotel to be
torn down. As the porch extends past the property line and is

on the side walk its removal would eventually become necessary. The excavation due to widening is found in the same manner as the fill and amounts to 200 cubic yards. The earth from this can be used in the fill and therefore the amount of the fill necessary will be 1950 cubic yards.

(4)   A section through the street as proposed is shown in the figure, page 16 . The distance between curbs is thirty-two feet. Five foot concrete walks are laid on each side of the street one foot from the property line, leaving a space of three feet between the edge of the walk and face of curb. The curbs are of the combined curb and gutter type shown in diagram. Two courses are used 1: 2 1/2: 5 proportion for the base and 1: 1 1/2: 2 1/4 for the wearing coat. The space between the curb and the walk should be planted with small shade trees at intervals of thirty-five feet, this adding very much to the looks of the street.

          The street should have a base of concrete six inches thick and a top covering of bituminous concrete three inches thick.

(5)   The side walks are of concrete five feet wide and should be made of two courses in proportion 1: 2 1/2: 5 for the base and 1: 1 1/2: 2 1/4 for the wearing coat. The thickness of the base being three inches and the wearing surface one inch, laid on an eight inch foundation of cinders.

          On the side of the street next to the Campus we propose to build a concrete wall. This wall will be discussed in full later in the thesis.
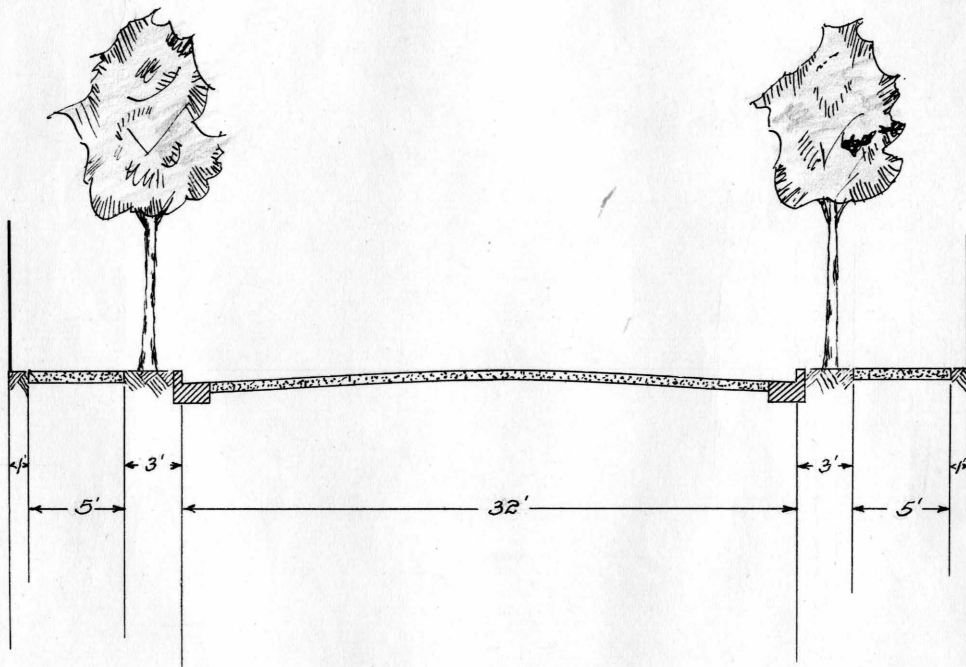
SECTION SHOWING JEFFERSON STREET
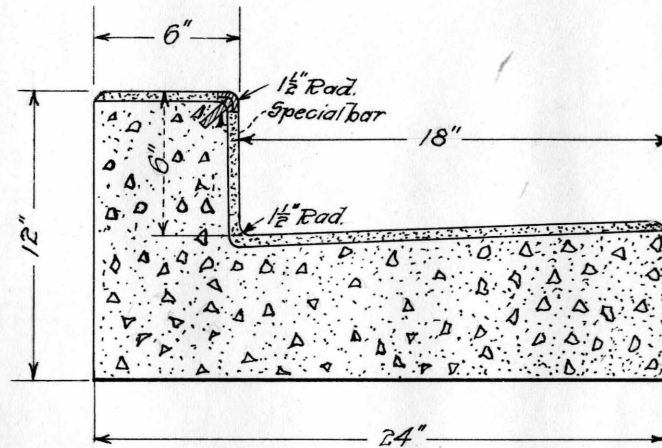
COMBINED CURB AND GUTTER

To be used on University and
Jefferson Sts.   Special bar
used on curbs at street and
alley intersections.

INTERSECTION OF WASHINGTON AND JEFFERSON STREET

This is the intersection of a vertical curve in Washington Street, with a 5 % grade in Jefferson Street. (See map of Intersection Design.) The vertical curve being practically level between curb lines on Jefferson Street gives ideal conditions for the best intersection design.
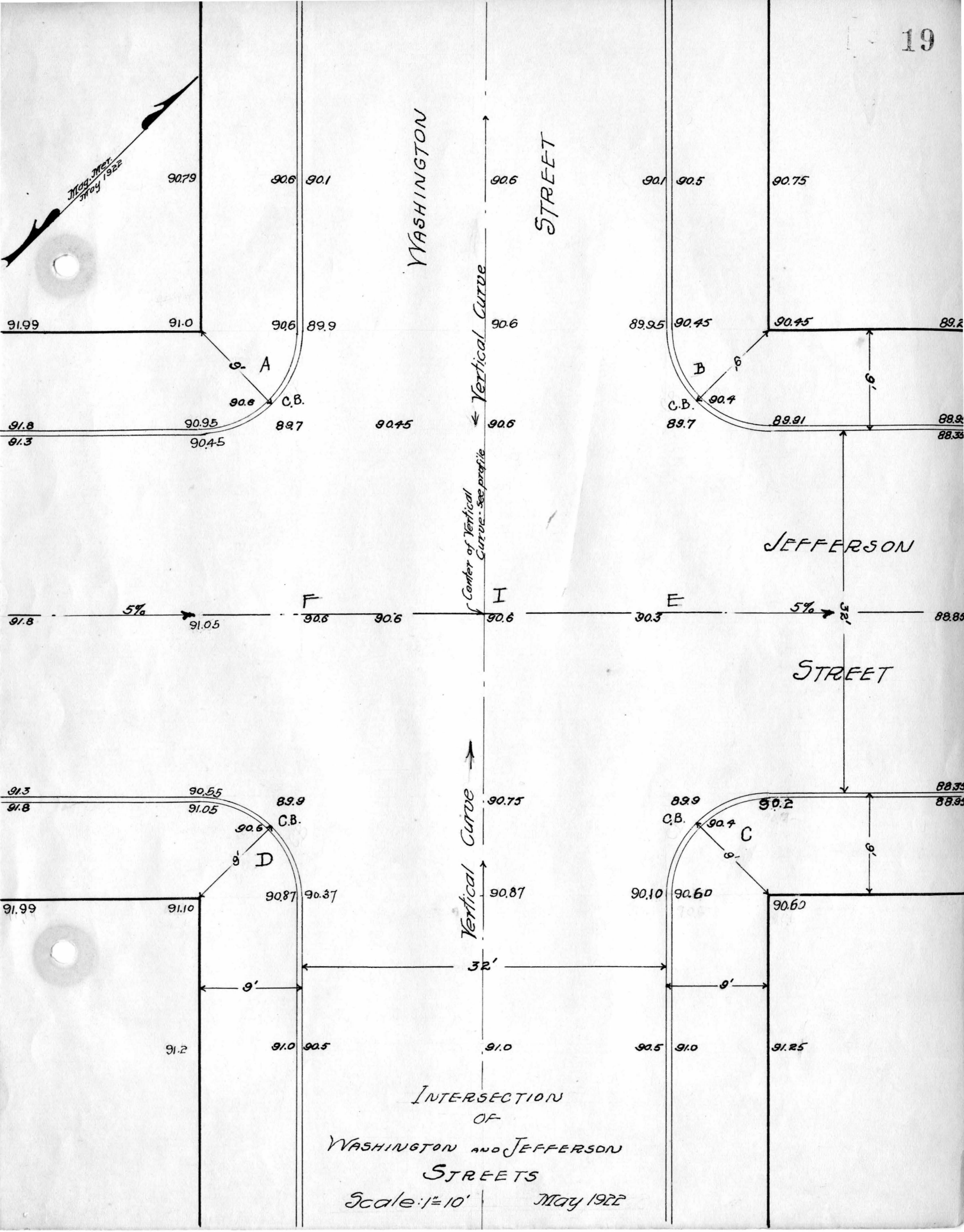
Washington Street is continued as a thoroughfare on a vertical curve except from I to E where the crown is lowered 0.3 foot to give an easy approach from the South.

The 5% down grade from Nelson Street is broken at F and carried level to intersection I.

The walks are laid on a slope of 1/4 inch to one foot except at corners where details of design interfere. At corner C the difference of elevation of curb and property line is 0.4 foot which is the maximum slope of walk in the design. This is equivalent to a 4.4% grade which is fully within the limits of good design.

The amount of surface water reaching this intersection from three directions will be considerable. We recommend the construction of a catch basin at each curb intersection in order to properly dispose of the water.

A standard form of catch basin is very desirable and the authors recommend the Newark, N.J. type. The details and specifications for the construction of this basin are not included in this thesis, but are accepted as given in Sewage, by Folwell, page 205.

Mag. Mer.
May 1922

90.79　　90.6　90.1

WASHINGTON

STREET

90.6

90.1　90.5　　90.75

91.99　　　91.0　　90.6　89.9

90.6

89.95　90.45　　90.45　　　89.2

A

9.

Vertical Curve

B　6

9'

90.8

C.B.

90.4

91.8　　90.95　88.7　　90.45　　90.6

C.B.
89.7　　89.91　　　88.35

91.3　　90.45

Center of Vertical
Curve - See profile

90.6

88.33

JEFFERSON

F　　　I　　　　E

5%　　　　　90.6　90.6　　90.6　　90.3　　　　5%　32'

91.8　　91.05

88.85

STREET

91.3　　90.55　89.9

91.8　　91.05　C.B.

90.75

Vertical Curve

88.35

89.9　　90.2　　88.95

90.6

C.B.　90.4

D

9'

C

9'

91.99　　　91.10

90.87　90.37

90.87

90.10　90.60

90.60

32'

9'

9'

91.2　　　91.0　90.5

91.0

90.5　91.0　　91.25

INTERSECTION
OF
WASHINGTON AND JEFFERSON
STREETS
Scale: 1"=10'　　May 1922

IMPROVEMENT OF WASHINGTON STREET

Washington Street, between Lee Avenue and Main Street, has a dip of approximately 20 feet. This gives the street a very bad appearance and also gives a grade on either side of Jefferson Street, which intersects Washington Street at the lowest point, sufficiently steep to inconvenience traffic.

For automobiles moving South on Washington Street it becomes necessary to obtain a speed in excess of the limit prescribed by city ordinance to ascend the grade leading into the intersection of Main and Washington Streets. This being the second busiest street intersection in Lexington renders the situation particularly bad. Crossing Jefferson Street at a speed in excess of 15 miles an hour is dangerous.

It is proposed to relieve these conditions and also give a street of respectible appearance and moderate grade by establishing a vertical curve in Washington Street. (See profile.)

This would involve making a fill of 3.95 feet at center of intersection of Jefferson and Washington Streets. By such a fill the only property injured would be the red brick building now occupied as a garage and the Lexington Pool Room on the opposite side of the street. It is proposed to tear down the building used by Finchley in the widening of Jefferson Street discussed under that topic. The pool room being a very old and poorly constructed frame building should be torn down. This, of course, will

be done should the University acquire this property for extension along Washington Street. Even should the University not buy this property, in its dilapidated condition can not last more than a few years and the loss in tearing it down would be small when balanced against the proposed improvement. Such an improvement should be proposed and supported by University authorities in case they do not buy the property.

The brick building now occupied by the garage is not of much value but nevertheless it would not be necessary to tear it down. The ceiling is very high and by raising the floor it could be made to serve its present purpose equally as well after the street is filled.

The details of the vertical curve are here given and illustrated by profile and special map (Vertical curve in Washington Street). (See pencil work.)

This vertical curve involves making a fill of approximately 850 cu. yards. This fill will necessitate a change in grade of Jefferson Street and a fill both east and west of Washington Street. This is taken up under Improvement of Jefferson Street.

WALL AT JEFFERSON STREET BOUNDARY OF CAMPUS

When Jefferson Street is improved as has been
proposed, the present board fence at the Campus boundary on
that street will necessarily be moved. Since the fence is in
a dilapidated condition and could not well be moved so as to
be put up again after the fill in the street and the necessary
improvements are made, and a similar fence is undesirable,
we propose that a concrete wall be constructed.

After the proposed improvements have been made
in University Street and Jefferson Street, and the new din-
ing hall erected, as well as the new fraternity houses on
these streets being built, this section of the Campus will be
the most frequented.

A concrete wall such as we propose will add
greatly to the looks of the street as well as lend dignity
to the Campus. We propose that this wall be constructed
from the corner of Washington and Jefferson Streets and run
N. 45° E. along the property line of the University for
195 feet. At this point a space of twenty feet is left open
for an alley leading back of the new dining hall. The wall
continues N. 45° E. for 66 feet to the intersection of the
walk which passes in front of the dining hall. A space of
10 feet is left for this walk. The remaining distance of
77 feet to the Memorial Gate, the wall continues N. 45° E.
Starting again on the other side of the Gate, the wall runs
N. 45° E. for 164 feet to the point of curvature. The curve
for the wall is constructed with the same center of curvature

as the street and sidewalks, the length of the wall being
70 feet on the curve. It then runs N. 80° E. for the remaining
distance of 125 feet.

We propose that this wall be constructed of con-
crete with proportions 1: 2 1/2: 5. (See diagram showing
section of wall and also diagram of of post) These posts are
to be put in every 28 feet and also at all corners and ends
of the wall. A contraction joint is made at each post. The
wall, as shown on the diagram, is paneled, each panel being
7 feet long. The grooves are made by angle irons being placed
on the inside of the forms.

The depth of the wall below the surface of
the earth is determined by the condition of the ground and
should extend down to a firm foundation.

The cost of construction is discussed and esti-
mated later in the thesis.

PROPOSED WALK TO NEW DINING HALL

In the extension of Washington and Lee University, it will be necessary for a new Students' Dining Hall to be built, as the present one will not accomodate the number of students desiring to board there.

It is proposed, therefore, that this new Dining Hall be erected on the Campus near the south-east corner and facing the road which leads through the Memorial Gate, as shown by the maps of the proposed extension of the Washington and Lee University.

In order for students to reach this dining hall from all parts of the Campus and the different buildings of the University, it is proposed that a walk be constructed from the present walk in front of Dr. Shannon's home to the side walk which will be built on Jefferson Street as discussed in the "Improvement of Jefferson Street." This walk in front of Dr. Shannon's leads from the law building (Tucker Hall) through the columns of Washington Building and connects with walks from the Electricity Laboratory or Power House, the Y.M.C.A., Reid Hall and Newcomb Hall. Students coming from these places will naturally follow the old walk and it also leads through the gate on Washington Street. Concrete walks from the Gymnasium, Lee and Graham Dormitories, another walk from Reid Hall and one from the Library, all connect into one walk which goes between the house occupied by Dr. Stevens and the one occupied by Dr. Shannon, and meets the other walk at the exact place the proposed walk from the New

Dining Hall will meet it. From these conditions the only logical place for the new walk would be as above stated.

The walk should be of concrete of two courses with proportions 1: 2 1/2: 5 for the base and 1: 1 1/2: 2 1/4 for the wearing coat. The width is ten feet (10'), the thickness of the base being 3 inches and the wearing surface being one inch, laid on a foundation of broken stone 8 inches (8") thick.

The center line of the walk is eighty-two feet (82') from the south west corner of the Memorial Gate on Jefferson Street as shown in the diagram. From this point the walk runs N. 45° W. and parallel with the New Dining Hall. In front of this place another walk should intersect the main walk and lead to the steps of the Dining Hall. The main walk should continue on the same course until at a distance of one hundred feet from the Jefferson Street side walk. At this point a reverse curve should be constructed with one radius eighty-one and a half feet(81.5') and the other seventy-six and eight tenths feet(76.8'), the curves being made as shown in the diagram. The angles at the centers of curvature are 18° 15' and 18° 35' respectively. At the point P on the diagram the line of the walk is again made straight and runs N. 45° W. parallel with and next to the property lines of the two houses, one being used at present as a dining hall for the students and the other occupied by Mrs. J.L. Patton. The walk continues on this course, N. 45° W., until it meets the walk which goes from the Washington Street entrance of the Campus to the Chapel.

At this walk it will be necessary to change the grade and the course in order to make it meet the walk in front of Dr. Shannon's at the proper place and at the right elevation. Between the two walks, a distance of fifty feet the new walk will run N. 10° W. and on a grade of 6.25%.

Should the walk be made on a uniform grade the entire distance to Jefferson Street, there would have to be considerable fill and the grade would be rather steep. It is proposed, therefore, that the grade be 0.25% for the first 160 feet, that is, the distance to the small embankment just below the last house (Shown on the Map). At this place it is desirable to erect steps. The steps should be made of stone or concrete and have a rise of eight inches (8"), and a tread of 10 inches (10"), the number of steps being seven as shown in the diagram and on the profile. The steps should have a small concrete wall on each side to prevent the earth from washing away and on to the steps. This wall should be about six inches wide (6") and extend out ten inches (10") from the top step and then down on the same grade as the steps, that is, a sixty-seven percent. (67°) grade. The steps should each have a very slight pitch toward the back and toward one end to shed water from the end and not the front, and to reduce danger from slipping.

The entire rise in the walk due to the steps is fifty-six inches (56") or four feet eight inches and this brings the walk up so that it can be run on a uniform grade to the first walk, the grade being 11.3%. From this walk as described above it runs on a 6.25% to the upper walk and runs N. 11° W.
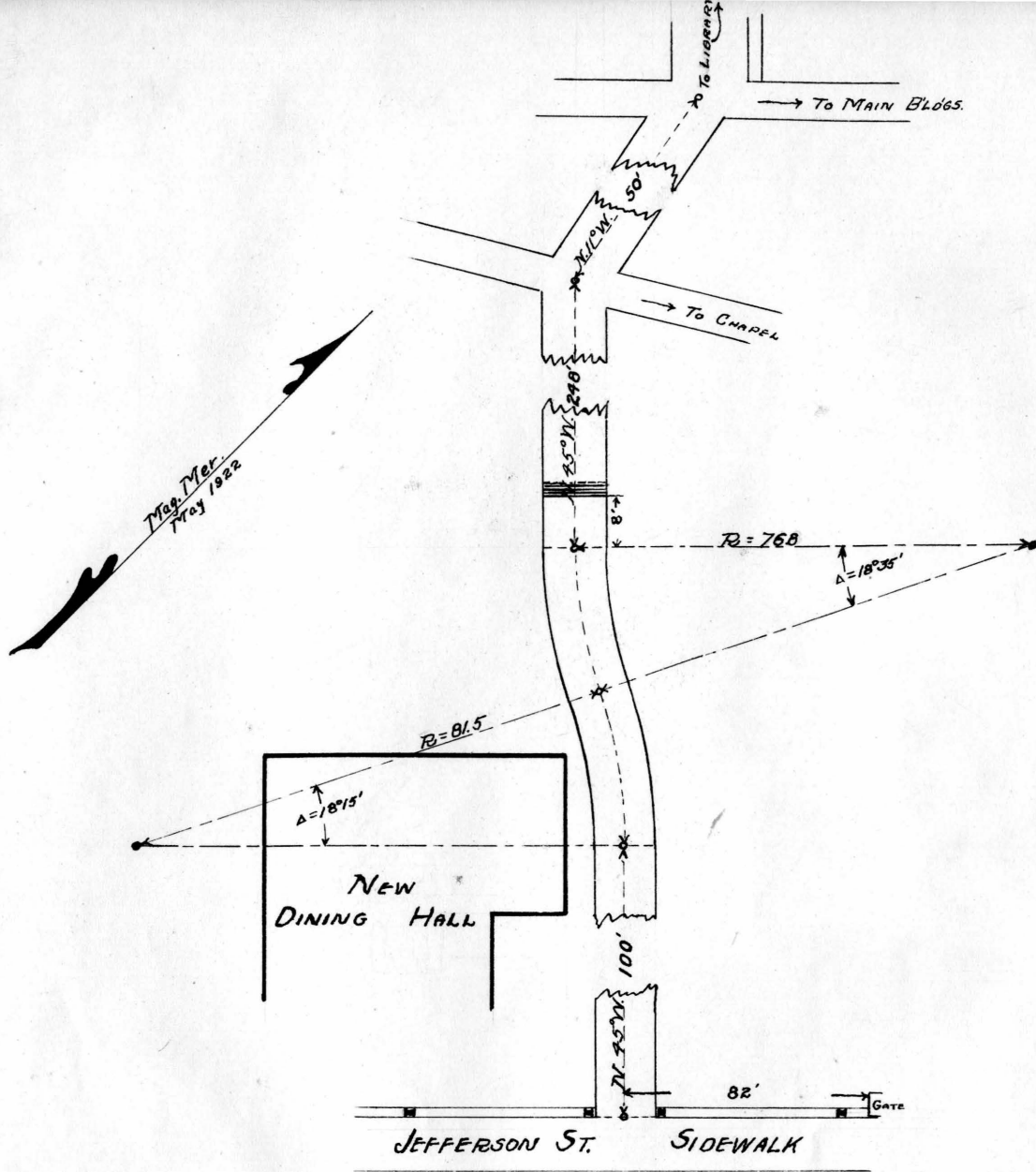
To Library

→ To Main B'ld'gs.

→ To Chapel

N.10°W. 50'

25°W. 248'

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R = 768

Δ = 18°35'

R = 81.5

Δ = 18°15'

New Dining Hall

N. 25°W. 100'

82'

Gate

Jefferson St. Sidewalk

Diagram of Walk

Showing

Location and Direction
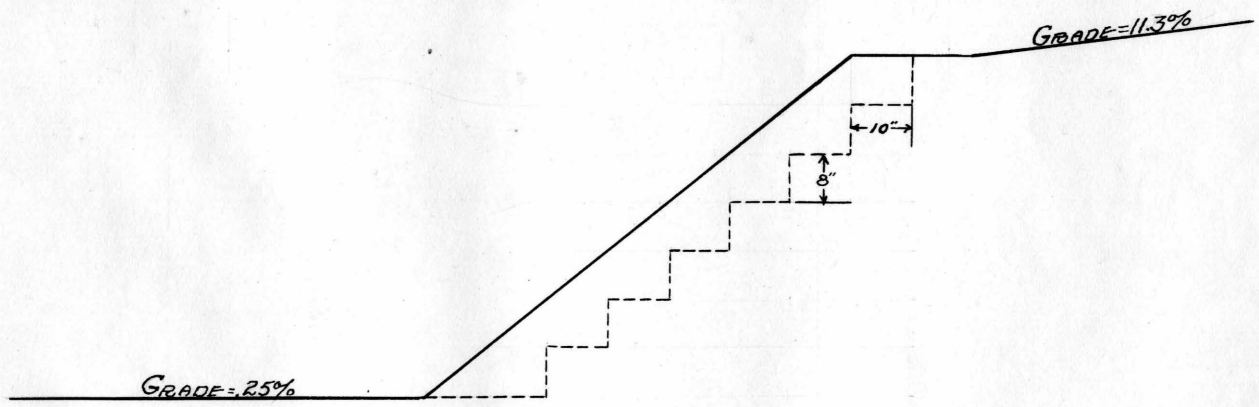
Scale. 1" = 30'

May. 1922.
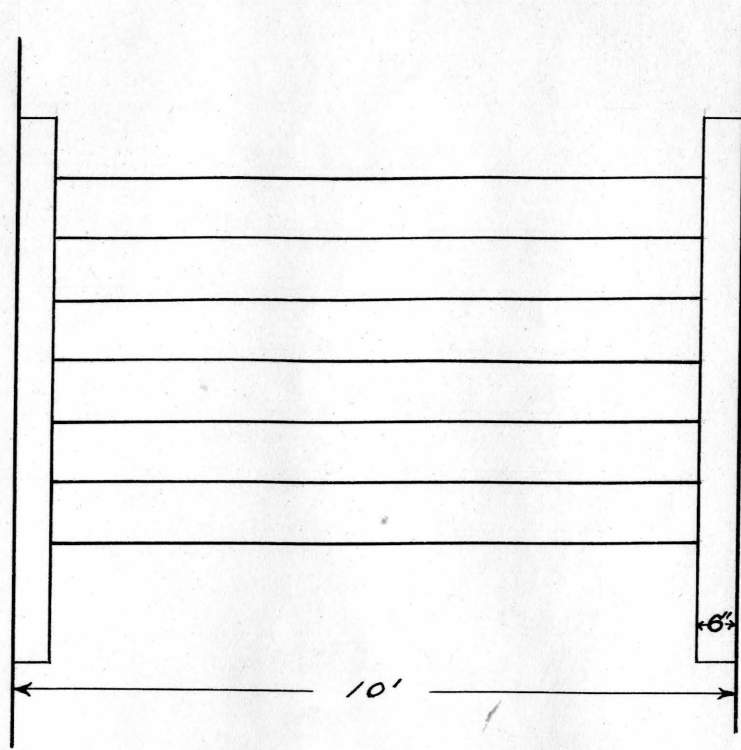
DIAGRAM OF STEPS IN SIDEWALK

TO NEW DINING HALL

SCALE: 1"=2½'   MAY, 1922

NEW LOCATION OF ROAD THROUGH CAMPUS

Since University Street has been improved so that
the Memorial Gate can be seen from Main Street, and Jefferson
Street has been widened and paved and the grade made uniform,
the traffic at the corner of Jefferson and University Streets
will be much increased. A large number of cars using these
two streets will go through the Campus in order to get to
Letcher Avenue, or V.M.I. as the road through the Memorial
Gate is the only one by which a car can conveniently reach
these two places. All tourists passing through Lexington
will naturally come to the Lee Memorial Chapel and they will
be obliged to use the road through the Campus.

This road at present enters through the Memorial
Gate, at one side, instead of the center and curves to the left
just past the entrance. It then goes up the hill and makes a
rather sharp reverse curve going behind Lee Chapel. The dis-
tance between the side of the road and the Chapel is only a
few feet and since the Chapel is to be remodeled and made
larger. And, also, to lend dignity to the site the road must
be changed.

It is proposed, therefore, that the road be alter-
ed as shown on the map of the Proposed Extension of Washington
and Lee University. We propose that the road enter directly
through the Memorial Gate and run perpendicularly to it for
41 feet. At this point a curve should be made in the road
so as to avoid going too high an elevation and to reduce the
fill and grade to a minimum. A curve is laid out as shown

with a radius of 100.5 feet, the angle at the center of curvature being 48° 20'. A reverse curve should then be put in, one radius being 53.5 feet and the other 280 feet, and the angles of curvature at the center being 61° 10' and 23° 20' respectively. From this point the road should continue straight N. 35° E. the remaining distance of 155 feet to the center of the old road.

From the station 4 + 50 in the center line of the new road and also the center line of the old road the grade in the new road is made the same as that of the old road, that is, a 4% grade. Since the intersection of Jefferson Street and University Street is designed with a 2.1 per cent. grade for the road going through the Memorial Gate, the grade of this new road will be 2.1 per cent. for the first one hundred and eighty feet, at this point changing to 4 per cent. It will not be necessary to construct a vertical curve in this road. (See profile and cross sections for the new road.) By taking cross sections and placing the new road as designed at the indicated elevations the fill is found by method of end areas. There will also be a small amount of excavation due to cutting away part of the bank just below the old road. The excavation is found in the same manner as the fill and amounts to 190 cubic yards, the fill amounting to 690 cubic yards as shown on profile.

Before the fill is made and the road constructed the ground should be stripped of the top soil to a depth of six inches. Then, after the fill is made and the new road constructed, the excavated earth and top soil should be used

on the downward slope from the road to the Campus boundary
at the wall on Jefferson Street. The grade from the road to
the wall should be uniform and the fill is included
approximately in the figures given for the entire fill.

The road, as shown on the cross sections, is a
fifteen foot road with a gutter on the upper side. The
diagram on page (32) shows the exact dimensions of the road.
It is a bituminous concrete road laid on a concrete base of
1: 2 1/2: 5 mixture five inches thick, the thickness of the
surface being three inches.
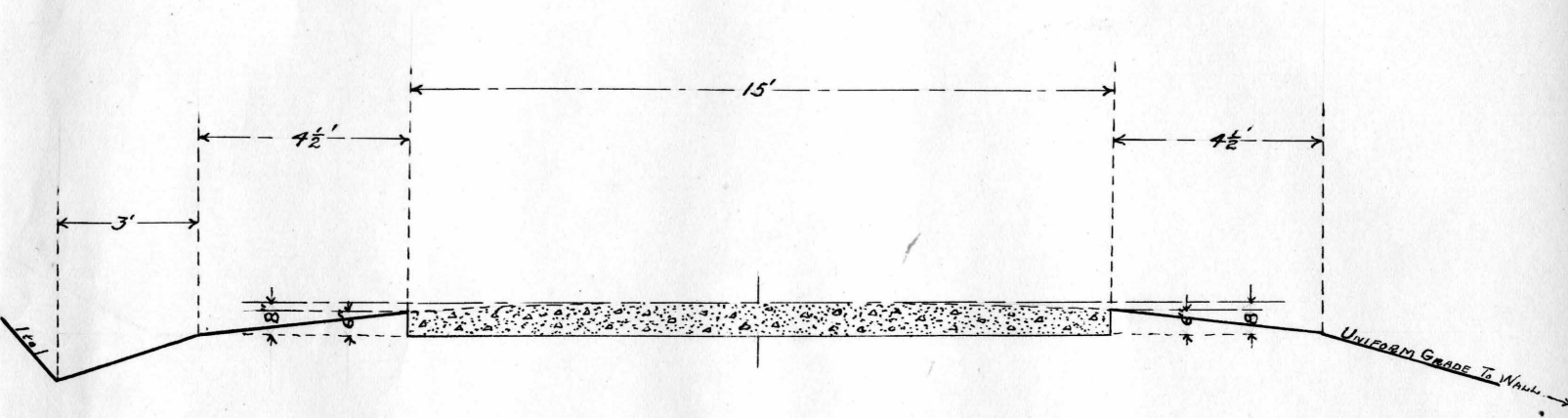
SECTION OF NEW ROAD THROUGH CAMPUS

SCALE. 1" = 4'

MAY. 1922.

ESTIMATE OF COST

Note portable crushers installed and excavated rock used in walks on University and Jefferson Streets and wall.

University Street.

Excavation:

980 cubic yards of rock at $2.40	$ 2352.00

Sidewalks:

Labor at $1.40 per cubic yard of concrete	35.00
42 barrels of cement at. $2.00	84.00
12 cubic yards of sand at $1.20	14.40
68 cubic yards of crushed stone at $.13	8.84

Curb and Gutters:

500 linear feet at $.25	125.00

Pavement:

833.3 square yards Bituminous Concrete at $2.75	2291.58
Total cost of improvements in University Street.	$4910.82

Jefferson Street.

Excavation:

200 cubic yards at $50	$ 100.00

Borrow

1950 cubic yards at $1.00	1950.00

Sidewalks:

175 barrels of cement at $2.00	35 0.00
50 cubic yards of snad at $1.20	60.00
Labor at $1.40 per cubic yard of concrete	142.80
273 cu. yds. of crushed stone at $.13	35.50

Combined Curb and Gutter:

1723.5 linear feet at $.25   443.90

Pavement:

3200 square yards Bituminous Concrete at $2.75   8800.00

7 Catch basins at $60.00 each   420.00

Total Cost of improvement in Jefferson Street $12289.20

Campus Road

Excavation:

193 cubic yards at $.50 $ 96.50

Borrow:

500 cubic yards at $1.00   500.00

Pavement:

750 square yards of Bituminous Concrete at $2.75, 2062.50

Total Cost of improvement in Campus Road $2659.00

Walk to Dining Hall

Excavation, grading, etc. $ 250.00

95 bbls. of cement at $2.00   280.00

26.86 cu. yds. of sand at $1.20   32.25

149.6 cu. yds. crushed stone at $.13   19.45

Labor at $1.40 per cu. yd. of concrete   77.70

Total Cost of New Walk $ 569.40

Wall on Jefferson Street

Labor 113 cu. yds. of concrete at $1.50 $ 169.50

140 bbls. cement at $2.00   280.00

52 cubic yards sand at $1.20   62.40

94 cu. yds. crushed stone at $.13   12.22   See NOTE

Lumber for forms   50.00

Total Cost of New Wall $574.12

Total Cost of All Improvements $21002.50

NOTE:~

The stone excavated from University St. used in concrete work
The estimate of walks is low, the quarrying of the stone itimized under
excavation and only the cost of crushing figured in cost of walks

LEE
MEMORIAL
CHAPEL

B.M. at
top of stone
against brick

FRONT
STEP

8"

1½"

3½"

½"

4½"

9"

4½"

3'

FRONT WALK.
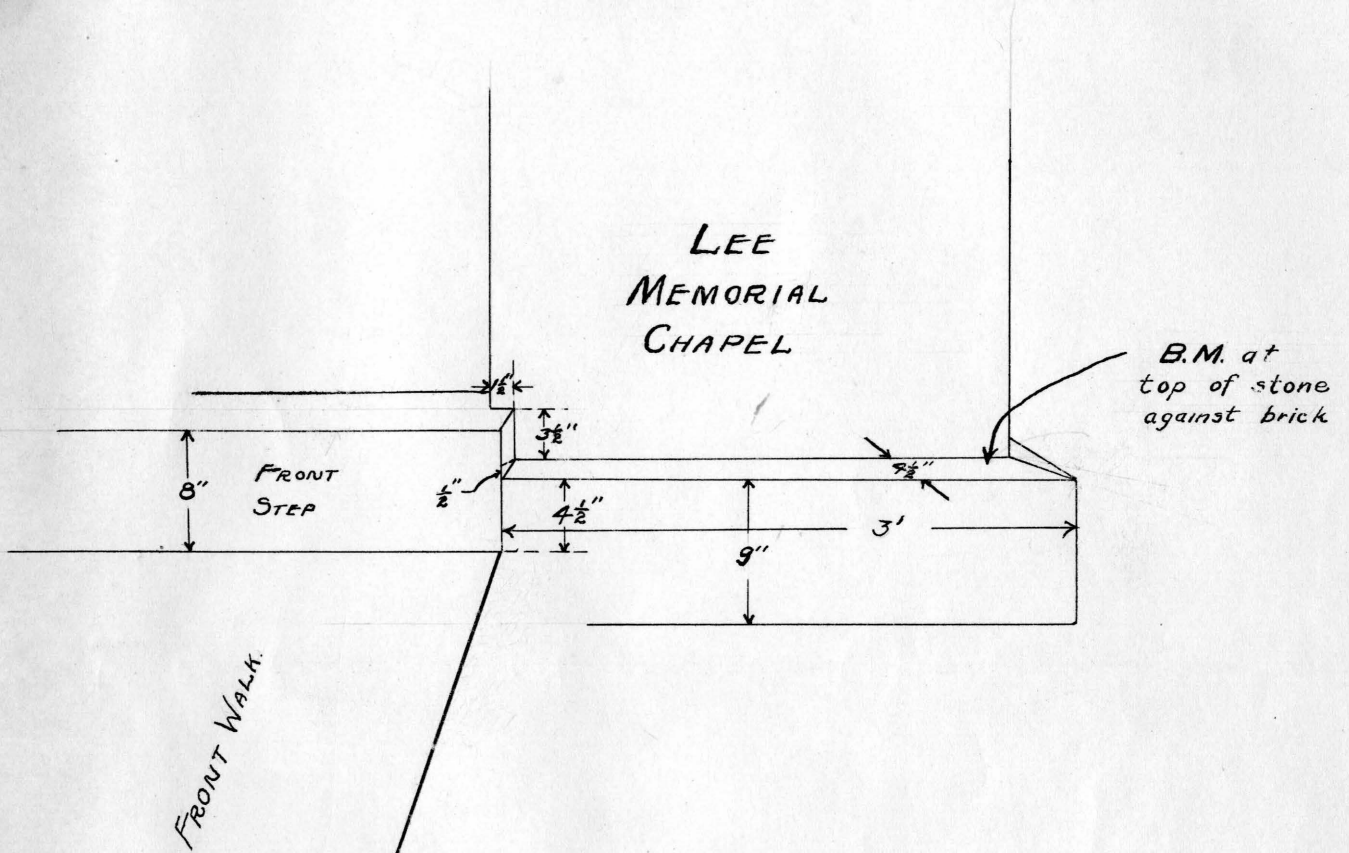
SKETCH SHOWING
LOCATION OF BENCH MARK
FOR LEVELS USED IN THIS THESIS