A.8. Traffic information

Table of Contents

A.8 TRAFFIC INFORMATION

The internal road network, traffic pattern and control devices are shown in the engineering plans prepared by Midwestern Consulting, Inc. for the Wayne Disposal, Inc. Site #2 Landfill (WDI) (submitted in March 1995).

A8.1 INBOUND TRAFFIC

Vehicles enter the Site 2 – Michigan Disposal Waste Treatment Plant (MDWTP)/ Wayne Disposal, Inc. (WDI) facility through the main entrance area located at 49350 N. I-94 Service Drive, Belleville, pass the security guard at the gate and approach the Receiving Building by a path up the middle of a large, paved apron. All vehicles must stop at the Receiving Building for processing of manifests, other shipping documents. Unless special circumstances require otherwise, each bulk waste vehicle continues along this central corridor onto the vehicle scales for weigh-in. Bulk loads are inspected and sampled at this point whereas drums and containers must be unloaded at the destined location for inspection and sampling. Drivers are instructed to ensure the cover/tarp is then replaced to secure the load during the rest of the time that the bulk waste vehicle waits to be emptied.

After pre-acceptance procedures identified in Attachment C2 Chemical and Physical Waste Analysis Plan indicates that the shipment may be accepted, vehicles waiting to be offloaded are staged until they are unloaded. If the laboratory fingerprint indicates the load must be rejected, the vehicle circles the Receiving Building and then exits the site.

When operations are ready to unload the waste, the vehicle driver is instructed to proceed via the internal roadway system to the appropriate waste unloading area. Drivers are directed to offload their shipment to:

1. The MDWTP East Treatment Building or West Treatment Building;
2. The MDWTP Truck Dock;
3. The MDWTP Container Storage Areas;
4. The WDI loads designated to WDI.
5. The WDI container storage area

A8.2 OUTBOUND TRAFFIC

All empty bulk waste transporting vehicles will proceed through Site #2's wheel wash. Bulk waste vehicles then proceed to the outbound scales. The driver finalizes recordkeeping at the Receiving Building and then exits the site through the main gate.

On-site transfer of treatment residuals from MDWTP to WDI are routed north along the road immediately west of Master Cell VI (MC VI) to the unloading platform in of MC VI.

A8.3 ACCESS ROAD SURFACING, CONSTRUCTION, AND STRUCTURAL ANALYSIS

Load bearing capacity requirements were met by analyzing existing road conditions for adequacy of design. The results are as follows:

A. The roads around the reception/office area, maintenance buildings and along the west side of Master Cell VI are built on native, in-situ soils. Broken concrete and gravel were used for road base and this entire area is surfaced with asphalt. Calculations show this road section to be nearly identical to design requirements and its condition bears this out as it is performing quite well without distress.

B. The road leading to Master Cell VI is designed similar to the reception area roads (described in item A) and has adequate bearing capacity and strength.

A8.3(A)TRAFFIC CONTROL AND TRAFFIC SIGNALS

All waste transport companies which frequently use the facilities receive a written notification that:

1. Wastes shipped to the facility must be placed into closed containers or covered during transportation. The structural integrity of the waste containers must prevent leakage while in transit.
2. All vehicles transporting hazardous waste to or from the facility shall use Rawsonville Road to enter and exit the facility.
3. Vehicles transporting hazardous waste to or from the facility shall not park or stand on the I-94 Service Drive and
4. Following sampling at the facility, the trailer shall be closed/retarped; and shall remain closed while waiting to empty.

The main entrance of the site is clearly marked with an identification sign and there are signs, which instruct vehicle drivers how to proceed safely along the waste delivery corridor. Further verbal directions are provided to the driver at the Receiving Building when their paperwork is reviewed. A standard “Stop” sign is posted at the exit to the N. I-94 Service Drive.

A8.4 ACCESS ROAD SURFACING AND LOAD BEARING CAPACITY

Existing road construction:

A. Near garages and check-in trailers and west side of MC VI

1. Approximately 6 inches Asphalt Concrete
2. Approximately 1 ft. of broken concrete and aggregate
3. Native Sand

Refer to the attached reference material about this design method. The following variables are estimated as follows:

Traffic index: 10
Design life: (Assumed in method) 10 years

Material “R” values:

Native sand = 30
Compacted clay = 15
Broken concrete/Coarse aggregate = 70
Broken Concrete/wood = 60

Analysis of adequacy of construction:

A. Roads near garages, check-in trailers and along west side of MC VI

TI =10

Subgrade R=30

Base R=70

Gravel Equivalent(GE) for surfacing=0.0032(TI)(100-R)=0.0032(10)(100-70)=0.96

Gravel Equivalent factor(G_f)=2.5(5.14/TI)$^{0.5}$=1.79

Thickness of asphalt concrete=GE/G_f=0.96/1.79=0.54 ft =6.5 inches

6 inches of Asphalt were used

GE required for road base=0.0032(10)(100-30)=2.24

GE provided by asphalt=1.79 x 0.5=0.9

GE to be provided by road base=2.24-0.9=1.34

G_f for base(for R=70 material)=1.1

Thickness of base required=1.34/1.10=1.2 ft =14.6 inches

Approximately 12 inches of base used

Summary:

	Design(In.)	Existing(In.)
Asphalt	6.5	6
Broken Concrete and aggregate	14.5	~12

FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES PARTIAL DOCUMENT AS REFERENCE

(REVISED JANUARY 1973)

Acknowledgment
This revised guide was prepared through the cooperative efforts of the County Engineers Association of California, the league of California Cities and the California Division of Highways. Much appreciation is expressed to the various members and personnel of the above organizations who were responsible for the original design guide which was published in July 1968.

This revised version was prepared by George Sherman, Robert Smith, Joseph Hannon, George Dick and Karl Baumeister of the Materials and Research Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel, and Herman Woodruff of the City and County Liaison Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel and Herman Woodruff of the City and County Liaison Department of the California Division of Highways, and W.R. Lovering of the Asphalt Institute, for their review and comment. Appreciation is also extended to the City and County Engineers who have reviewed the rough draft and contributed to this publication by their suggestions.

Foreword

This booklet is intended to provide a concise and useful tool to the designer of city streets and county roads.

The information in this guide has been updated since the last printing in July 1968, but the concepts and methods used herein are not new. However, a new section has been added which covers the design of full depth asphalt concrete pavements.

The guide is based on the results of extensive studies, tests and numerous reports by various agencies concerning the many factors affecting the structural design of roadway sections.

This guide should prove quite helpful to many cities and counties irrespective of the amount or lack of laboratory facilities and testing equipment.

Suggestions for improvements to this guide may be directed to either the County Engineers Association of California or the League of California Cities.

Estimation of T.I. according to the road type

In the absence of more detailed knowledge, traffic may be estimated by considering the type of facility to be designed. Estimates of traffic made in this manner tend to be inaccurate, and for this reason, should allow for a safety factor. The estimated Traffic Index should be justified by a description of the facility, the area it serves, and the normal types of traffic carried. The table below lists several road categories and the T.I. which might be expected to correspond with these categories. The last four categories in the table are difficult to estimate. Since roads in these categories are more critical with regard to repair, due to heavier traffic, the T.I. should be estimated using either the standard method or the chart shown in figure 1.

Type of facility	**T.I**
Minor residential streets and cul-de-sacs	4
Residential streets	4.5
Residential collectors and minor or secondary collectors	5
Major or primary collectors providing for traffic movement between minor collectors and major aterials	6
Farm-to-market roads providing for the movement of traffic through agricultural areas to major arterials	5-7
Commercial roads(arterials serving areas which are primarily commercial in nature)	7-9
Connector roads(highways and arterials connecting two areas of relatively high population density)	7-9
Major city streets and thoroughfares and county highways	7-9
Streets and highways carrying heavy vehicle traffic. This would include streets in heavily industrialized areas	9+

Estimation of R-value using soil classification

Rough estimates of R-value can be made using some simple soil classification tests in conjunction with sand equivalent (SE) test. Each soil type (e.g. sandy clay, etc.) roughly encompasses a certain R-value range. The R-value range for a soil type may be narrowed by knowing more about the soil's plasticity and by knowing its sand equivalent value (Test method no. Calif 217). Soil classification sheets and triangular chart (Figures 3 and 4) are included as aids. To classify soils on the triangular chart (Figure 4), a sieve analysis and hydrometer analysis are necessary (Test Method Nos. Calif. 201, 202, and 203).

When the soil classification has been determined from figure 4, the chart in figure 5 may be used to approximate the R-Value. In this chart, the curves representing the various soil types show a stylized approximate frequency distribution of R-values for this particular type soil.

For fine grained materials, the upper tail or high R-value portion of the curve represents lower plasticity, relative to the soil type, while the lower tail represents soils of the same type having higher plasticity. The sand equivalent values provide additional subdivisions within the chart.

For a particular SE value, chances are good that the R-value for the same material will be as high or higher than the R-value designated by the corresponding dashed line. The converse, however, is not true since it is possible for a material to have a high R-value with a relatively low SE.

The curves for coarse-grained materials are affected in the same manner, by the presence of clay, with the lower tail representing materials with little or no clay, the lower tail represents hard, smooth-surfaced and poorly graded(well sorted) material while the upper tail represents rough-surfaced and well graded material.

The use of this chart must be tempered with good judgment and it should always be borne in mind that R-values obtained in this manner are estimations only. The reasoning behind these estimations should be fully documented in the materials report to provide to reviewers with as much basic data as possible.

Table of Contents

A.8 TRAFFIC INFORMATION

The internal road network, traffic pattern and control devices are shown in the engineering plans prepared by Midwestern Consulting, Inc. for the Wayne Disposal, Inc. Site #2 Landfill (WDI) (submitted in March 1995).

A8.1 INBOUND TRAFFIC

Vehicles enter the Site 2 – Michigan Disposal Waste Treatment Plant (MDWTP)/ Wayne Disposal, Inc. (WDI) facility through the main entrance area located at 49350 N. I-94 Service Drive, Belleville, pass the security guard at the gate and approach the Receiving Building by a path up the middle of a large, paved apron. All vehicles must stop at the Receiving Building for processing of manifests, other shipping documents. Unless special circumstances require otherwise, each bulk waste vehicle continues along this central corridor onto the vehicle scales for weigh-in. Bulk loads are inspected and sampled at this point whereas drums and containers must be unloaded at the destined location for inspection and sampling. Drivers are instructed to ensure the cover/tarp is then replaced to secure the load during the rest of the time that the bulk waste vehicle waits to be emptied.

After pre-acceptance procedures identified in Attachment C2 Chemical and Physical Waste Analysis Plan indicates that the shipment may be accepted, vehicles waiting to be offloaded are staged until they are unloaded. If the laboratory fingerprint indicates the load must be rejected, the vehicle circles the Receiving Building and then exits the site.

When operations are ready to unload the waste, the vehicle driver is instructed to proceed via the internal roadway system to the appropriate waste unloading area. Drivers are directed to offload their shipment to:

1. The MDWTP East Treatment Building or West Treatment Building;
2. The MDWTP Truck Dock;
3. The MDWTP Container Storage Areas;
4. The WDI loads designated to WDI.
5. The WDI container storage area

A8.2 OUTBOUND TRAFFIC

All empty bulk waste transporting vehicles will proceed through Site #2's wheel wash. Bulk waste vehicles then proceed to the outbound scales. The driver finalizes recordkeeping at the Receiving Building and then exits the site through the main gate.

On-site transfer of treatment residuals from MDWTP to WDI are routed north along the road immediately west of Master Cell VI (MC VI) to the unloading platform in of MC VI.

A8.3 ACCESS ROAD SURFACING, CONSTRUCTION, AND STRUCTURAL ANALYSIS

Load bearing capacity requirements were met by analyzing existing road conditions for adequacy of design. The results are as follows:

A. The roads around the reception/office area, maintenance buildings and along the west side of Master Cell VI are built on native, in-situ soils. Broken concrete and gravel were used for road base and this entire area is surfaced with asphalt. Calculations show this road section to be nearly identical to design requirements and its condition bears this out as it is performing quite well without distress.

B. The road leading to Master Cell VI is designed similar to the reception area roads (described in item A) and has adequate bearing capacity and strength.

A8.3(A)TRAFFIC CONTROL AND TRAFFIC SIGNALS

All waste transport companies which frequently use the facilities receive a written notification that:

1. Wastes shipped to the facility must be placed into closed containers or covered during transportation. The structural integrity of the waste containers must prevent leakage while in transit.
2. All vehicles transporting hazardous waste to or from the facility shall use Rawsonville Road to enter and exit the facility.
3. Vehicles transporting hazardous waste to or from the facility shall not park or stand on the I-94 Service Drive and
4. Following sampling at the facility, the trailer shall be closed/retarped; and shall remain closed while waiting to empty.

The main entrance of the site is clearly marked with an identification sign and there are signs, which instruct vehicle drivers how to proceed safely along the waste delivery corridor. Further verbal directions are provided to the driver at the Receiving Building when their paperwork is reviewed. A standard “Stop” sign is posted at the exit to the N. I-94 Service Drive.

A8.4 ACCESS ROAD SURFACING AND LOAD BEARING CAPACITY

Existing road construction:

A. Near garages and check-in trailers and west side of MC VI

1. Approximately 6 inches Asphalt Concrete
2. Approximately 1 ft. of broken concrete and aggregate
3. Native Sand

Refer to the attached reference material about this design method. The following variables are estimated as follows:

Traffic index: 10
Design life: (Assumed in method) 10 years

<u>Material “R” values</u>:

Native sand = 30
Compacted clay = 15
Broken concrete/Coarse aggregate = 70
Broken Concrete/wood = 60

Analysis of adequacy of construction:

A. Roads near garages, check-in trailers and along west side of MC VI

TI =10

Subgrade R=30

Base R=70

Gravel Equivalent(GE) for surfacing=0.0032(TI)(100-R)=0.0032(10)(100-70)=0.96

Gravel Equivalent factor(G_f)=2.5(5.14/TI)$^{0.5}$=1.79

Thickness of asphalt concrete=GE/G_f=0.96/1.79=0.54 ft =6.5 inches

6 inches of Asphalt were used

GE required for road base=0.0032(10)(100-30)=2.24

GE provided by asphalt=1.79 x 0.5=0.9

GE to be provided by road base=2.24-0.9=1.34

G_f for base(for R=70 material)=1.1

Thickness of base required=1.34/1.10=1.2 ft =14.6 inches

Approximately 12 inches of base used

Summary:

	Design(In.)	Existing(In.)
Asphalt	6.5	6
Broken Concrete and aggregate	14.5	~12

FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES PARTIAL DOCUMENT AS REFERENCE

(REVISED JANUARY 1973)

Acknowledgment
This revised guide was prepared through the cooperative efforts of the County Engineers Association of California, the league of California Cities and the California Division of Highways. Much appreciation is expressed to the various members and personnel of the above organizations who were responsible for the original design guide which was published in July 1968.

This revised version was prepared by George Sherman, Robert Smith, Joseph Hannon, George Dick and Karl Baumeister of the Materials and Research Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel, and Herman Woodruff of the City and County Liaison Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel and Herman Woodruff of the City and County Liaison Department of the California Division of Highways, and W.R. Lovering of the Asphalt Institute, for their review and comment. Appreciation is also extended to the City and County Engineers who have reviewed the rough draft and contributed to this publication by their suggestions.

Foreword

This booklet is intended to provide a concise and useful tool to the designer of city streets and county roads.

The information in this guide has been updated since the last printing in July 1968, but the concepts and methods used herein are not new. However, a new section has been added which covers the design of full depth asphalt concrete pavements.

The guide is based on the results of extensive studies, tests and numerous reports by various agencies concerning the many factors affecting the structural design of roadway sections.

This guide should prove quite helpful to many cities and counties irrespective of the amount or lack of laboratory facilities and testing equipment.

Suggestions for improvements to this guide may be directed to either the County Engineers Association of California or the League of California Cities.

Estimation of T.I. according to the road type

In the absence of more detailed knowledge, traffic may be estimated by considering the type of facility to be designed. Estimates of traffic made in this manner tend to be inaccurate, and for this reason, should allow for a safety factor. The estimated Traffic Index should be justified by a description of the facility, the area it serves, and the normal types of traffic carried. The table below lists several road categories and the T.I. which might be expected to correspond with these categories. The last four categories in the table are difficult to estimate. Since roads in these categories are more critical with regard to repair, due to heavier traffic, the T.I. should be estimated using either the standard method or the chart shown in figure 1.

Type of facility	**T.I**
Minor residential streets and cul-de-sacs	4
Residential streets	4.5
Residential collectors and minor or secondary collectors	5
Major or primary collectors providing for traffic movement between minor collectors and major aterials	6
Farm-to-market roads providing for the movement of traffic through agricultural areas to major arterials	5-7
Commercial roads(arterials serving areas which are primarily commercial in nature)	7-9
Connector roads(highways and arterials connecting two areas of relatively high population density)	7-9
Major city streets and thoroughfares and county highways	7-9
Streets and highways carrying heavy vehicle traffic. This would include streets in heavily industrialized areas	9+

Estimation of R-value using soil classification

Rough estimates of R-value can be made using some simple soil classification tests in conjunction with sand equivalent (SE) test. Each soil type (e.g. sandy clay, etc.) roughly encompasses a certain R-value range. The R-value range for a soil type may be narrowed by knowing more about the soil's plasticity and by knowing its sand equivalent value (Test method no. Calif 217). Soil classification sheets and triangular chart (Figures 3 and 4) are included as aids. To classify soils on the triangular chart (Figure 4), a sieve analysis and hydrometer analysis are necessary (Test Method Nos. Calif. 201, 202, and 203).

When the soil classification has been determined from figure 4, the chart in figure 5 may be used to approximate the R-Value. In this chart, the curves representing the various soil types show a stylized approximate frequency distribution of R-values for this particular type soil.

For fine grained materials, the upper tail or high R-value portion of the curve represents lower plasticity, relative to the soil type, while the lower tail represents soils of the same type having higher plasticity. The sand equivalent values provide additional subdivisions within the chart.

For a particular SE value, chances are good that the R-value for the same material will be as high or higher than the R-value designated by the corresponding dashed line. The converse, however, is not true since it is possible for a material to have a high R-value with a relatively low SE.

The curves for coarse-grained materials are affected in the same manner, by the presence of clay, with the lower tail representing materials with little or no clay, the lower tail represents hard, smooth-surfaced and poorly graded(well sorted) material while the upper tail represents rough-surfaced and well graded material.

The use of this chart must be tempered with good judgment and it should always be borne in mind that R-values obtained in this manner are estimations only. The reasoning behind these estimations should be fully documented in the materials report to provide to reviewers with as much basic data as possible.

Table of Contents

A.8 TRAFFIC INFORMATION

The internal road network, traffic pattern and control devices are shown in the engineering plans prepared by Midwestern Consulting, Inc. for the Wayne Disposal, Inc. Site #2 Landfill (WDI) (submitted in March 1995).

A8.1 INBOUND TRAFFIC

Vehicles enter the Site 2 – Michigan Disposal Waste Treatment Plant (MDWTP)/ Wayne Disposal, Inc. (WDI) facility through the main entrance area located at 49350 N. I-94 Service Drive, Belleville, pass the security guard at the gate and approach the Receiving Building by a path up the middle of a large, paved apron. All vehicles must stop at the Receiving Building for processing of manifests, other shipping documents. Unless special circumstances require otherwise, each bulk waste vehicle continues along this central corridor onto the vehicle scales for weigh-in. Bulk loads are inspected and sampled at this point whereas drums and containers must be unloaded at the destined location for inspection and sampling. Drivers are instructed to ensure the cover/tarp is then replaced to secure the load during the rest of the time that the bulk waste vehicle waits to be emptied.

After pre-acceptance procedures identified in Attachment C2 Chemical and Physical Waste Analysis Plan indicates that the shipment may be accepted, vehicles waiting to be offloaded are staged until they are unloaded. If the laboratory fingerprint indicates the load must be rejected, the vehicle circles the Receiving Building and then exits the site.

When operations are ready to unload the waste, the vehicle driver is instructed to proceed via the internal roadway system to the appropriate waste unloading area. Drivers are directed to offload their shipment to:

1. The MDWTP East Treatment Building or West Treatment Building;
2. The MDWTP Truck Dock;
3. The MDWTP Container Storage Areas;
4. The WDI loads designated to WDI.
5. The WDI container storage area

A8.2 OUTBOUND TRAFFIC

All empty bulk waste transporting vehicles will proceed through Site #2’s wheel wash. Bulk waste vehicles then proceed to the outbound scales. The driver finalizes recordkeeping at the Receiving Building and then exits the site through the main gate.

On-site transfer of treatment residuals from MDWTP to WDI are routed north along the road immediately west of Master Cell VI (MC VI) to the unloading platform in of MC VI.

A8.3 ACCESS ROAD SURFACING, CONSTRUCTION, AND STRUCTURAL ANALYSIS

Load bearing capacity requirements were met by analyzing existing road conditions for adequacy of design. The results are as follows:

A. The roads around the reception/office area, maintenance buildings and along the west side of Master Cell VI are built on native, in-situ soils. Broken concrete and gravel were used for road base and this entire area is surfaced with asphalt. Calculations show this road section to be nearly identical to design requirements and its condition bears this out as it is performing quite well without distress.

B. The road leading to Master Cell VI is designed similar to the reception area roads (described in item A) and has adequate bearing capacity and strength.

A8.3(A) TRAFFIC CONTROL AND TRAFFIC SIGNALS

All waste transport companies which frequently use the facilities receive a written notification that:

1. Wastes shipped to the facility must be placed into closed containers or covered during transportation. The structural integrity of the waste containers must prevent leakage while in transit.
2. All vehicles transporting hazardous waste to or from the facility shall use Rawsonville Road to enter and exit the facility.
3. Vehicles transporting hazardous waste to or from the facility shall not park or stand on the I-94 Service Drive and
4. Following sampling at the facility, the trailer shall be closed/retarped; and shall remain closed while waiting to empty.

The main entrance of the site is clearly marked with an identification sign and there are signs, which instruct vehicle drivers how to proceed safely along the waste delivery corridor. Further verbal directions are provided to the driver at the Receiving Building when their paperwork is reviewed. A standard "Stop" sign is posted at the exit to the N. I-94 Service Drive.

A8.4 ACCESS ROAD SURFACING AND LOAD BEARING CAPACITY

Existing road construction:

A. Near garages and check-in trailers and west side of MC VI

1. Approximately 6 inches Asphalt Concrete
2. Approximately 1 ft. of broken concrete and aggregate
3. Native Sand

Refer to the attached reference material about this design method. The following variables are estimated as follows:

Traffic index: 10
Design life: (Assumed in method) 10 years

Material "R" values:

Native sand = 30
Compacted clay = 15
Broken concrete/Coarse aggregate = 70
Broken Concrete/wood = 60

Analysis of adequacy of construction:

A. Roads near garages, check-in trailers and along west side of MC VI

TI =10

Subgrade R=30

Base R=70

Gravel Equivalent(GE) for surfacing=0.0032(TI)(100-R)=0.0032(10)(100-70)=0.96

Gravel Equivalent factor(G_f)=2.5(5.14/TI)$^{0.5}$=1.79

Thickness of asphalt concrete=GE/G_f=0.96/1.79=0.54 ft =6.5 inches

6 inches of Asphalt were used

GE required for road base=0.0032(10)(100-30)=2.24

GE provided by asphalt=1.79 x 0.5=0.9

GE to be provided by road base=2.24-0.9=1.34

G_f for base(for R=70 material)=1.1

Thickness of base required=1.34/1.10=1.2 ft =14.6 inches

Approximately 12 inches of base used

Summary:

	Design(In.)	Existing(In.)
Asphalt	6.5	6
Broken Concrete and aggregate	14.5	~12

FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES PARTIAL DOCUMENT AS REFERENCE

(REVISED JANUARY 1973)

Acknowledgment
This revised guide was prepared through the cooperative efforts of the County Engineers Association of California, the league of California Cities and the California Division of Highways. Much appreciation is expressed to the various members and personnel of the above organizations who were responsible for the original design guide which was published in July 1968.

This revised version was prepared by George Sherman, Robert Smith, Joseph Hannon, George Dick and Karl Baumeister of the Materials and Research Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel, and Herman Woodruff of the City and County Liaison Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel and Herman Woodruff of the City and County Liaison Department of the California Division of Highways, and W.R. Lovering of the Asphalt Institute, for their review and comment. Appreciation is also extended to the City and County Engineers who have reviewed the rough draft and contributed to this publication by their suggestions.

Foreword

This booklet is intended to provide a concise and useful tool to the designer of city streets and county roads.

The information in this guide has been updated since the last printing in July 1968, but the concepts and methods used herein are not new. However, a new section has been added which covers the design of full depth asphalt concrete pavements.

The guide is based on the results of extensive studies, tests and numerous reports by various agencies concerning the many factors affecting the structural design of roadway sections.

This guide should prove quite helpful to many cities and counties irrespective of the amount or lack of laboratory facilities and testing equipment.

Suggestions for improvements to this guide may be directed to either the County Engineers Association of California or the League of California Cities.

Estimation of T.I. according to the road type

In the absence of more detailed knowledge, traffic may be estimated by considering the type of facility to be designed. Estimates of traffic made in this manner tend to be inaccurate, and for this reason, should allow for a safety factor. The estimated Traffic Index should be justified by a description of the facility, the area it serves, and the normal types of traffic carried. The table below lists several road categories and the T.I. which might be expected to correspond with these categories. The last four categories in the table are difficult to estimate. Since roads in these categories are more critical with regard to repair, due to heavier traffic, the T.I. should be estimated using either the standard method or the chart shown in figure 1.

Type of facility	**T.I**
Minor residential streets and cul-de-sacs	4
Residential streets	4.5
Residential collectors and minor or secondary collectors	5
Major or primary collectors providing for traffic movement between minor collectors and major aterials	6
Farm-to-market roads providing for the movement of traffic through agricultural areas to major arterials	5-7
Commercial roads(arterials serving areas which are primarily commercial in nature)	7-9
Connector roads(highways and arterials connecting two areas of relatively high population density)	7-9
Major city streets and thoroughfares and county highways	7-9
Streets and highways carrying heavy vehicle traffic. This would include streets in heavily industrialized areas	9+

Estimation of R-value using soil classification

Rough estimates of R-value can be made using some simple soil classification tests in conjunction with sand equivalent (SE) test. Each soil type (e.g. sandy clay, etc.) roughly encompasses a certain R-value range. The R-value range for a soil type may be narrowed by knowing more about the soil's plasticity and by knowing its sand equivalent value (Test method no. Calif 217). Soil classification sheets and triangular chart (Figures 3 and 4) are included as aids. To classify soils on the triangular chart (Figure 4), a sieve analysis and hydrometer analysis are necessary (Test Method Nos. Calif. 201, 202, and 203).

When the soil classification has been determined from figure 4, the chart in figure 5 may be used to approximate the R-Value. In this chart, the curves representing the various soil types show a stylized approximate frequency distribution of R-values for this particular type soil.

For fine grained materials, the upper tail or high R-value portion of the curve represents lower plasticity, relative to the soil type, while the lower tail represents soils of the same type having higher plasticity. The sand equivalent values provide additional subdivisions within the chart.

For a particular SE value, chances are good that the R-value for the same material will be as high or higher than the R-value designated by the corresponding dashed line. The converse, however, is not true since it is possible for a material to have a high R-value with a relatively low SE.

The curves for coarse-grained materials are affected in the same manner, by the presence of clay, with the lower tail representing materials with little or no clay, the lower tail represents hard, smooth-surfaced and poorly graded(well sorted) material while the upper tail represents rough-surfaced and well graded material.

The use of this chart must be tempered with good judgment and it should always be borne in mind that R-values obtained in this manner are estimations only. The reasoning behind these estimations should be fully documented in the materials report to provide to reviewers with as much basic data as possible.

Table of Contents

A.8 TRAFFIC INFORMATION

The internal road network, traffic pattern and control devices are shown in the engineering plans prepared by Midwestern Consulting, Inc. for the Wayne Disposal, Inc. Site #2 Landfill (WDI) (submitted in March 1995).

A8.1 INBOUND TRAFFIC

Vehicles enter the Site 2 – Michigan Disposal Waste Treatment Plant (MDWTP)/ Wayne Disposal, Inc. (WDI) facility through the main entrance area located at 49350 N. I-94 Service Drive, Belleville, pass the security guard at the gate and approach the Receiving Building by a path up the middle of a large, paved apron. All vehicles must stop at the Receiving Building for processing of manifests, other shipping documents. Unless special circumstances require otherwise, each bulk waste vehicle continues along this central corridor onto the vehicle scales for weigh-in. Bulk loads are inspected and sampled at this point whereas drums and containers must be unloaded at the destined location for inspection and sampling. Drivers are instructed to ensure the cover/tarp is then replaced to secure the load during the rest of the time that the bulk waste vehicle waits to be emptied.

After pre-acceptance procedures identified in Attachment C2 Chemical and Physical Waste Analysis Plan indicates that the shipment may be accepted, vehicles waiting to be offloaded are staged until they are unloaded. If the laboratory fingerprint indicates the load must be rejected, the vehicle circles the Receiving Building and then exits the site.

When operations are ready to unload the waste, the vehicle driver is instructed to proceed via the internal roadway system to the appropriate waste unloading area. Drivers are directed to offload their shipment to:

1. The MDWTP East Treatment Building or West Treatment Building;
2. The MDWTP Truck Dock;
3. The MDWTP Container Storage Areas;
4. The WDI loads designated to WDI.
5. The WDI container storage area

A8.2 OUTBOUND TRAFFIC

All empty bulk waste transporting vehicles will proceed through Site #2's wheel wash. Bulk waste vehicles then proceed to the outbound scales. The driver finalizes recordkeeping at the Receiving Building and then exits the site through the main gate.

On-site transfer of treatment residuals from MDWTP to WDI are routed north along the road immediately west of Master Cell VI (MC VI) to the unloading platform in of MC VI.

A8.3 ACCESS ROAD SURFACING, CONSTRUCTION, AND STRUCTURAL ANALYSIS

Load bearing capacity requirements were met by analyzing existing road conditions for adequacy of design. The results are as follows:

A. The roads around the reception/office area, maintenance buildings and along the west side of Master Cell VI are built on native, in-situ soils. Broken concrete and gravel were used for road base and this entire area is surfaced with asphalt. Calculations show this road section to be nearly identical to design requirements and its condition bears this out as it is performing quite well without distress.

B. The road leading to Master Cell VI is designed similar to the reception area roads (described in item A) and has adequate bearing capacity and strength.

A8.3(A)TRAFFIC CONTROL AND TRAFFIC SIGNALS

All waste transport companies which frequently use the facilities receive a written notification that:

1. Wastes shipped to the facility must be placed into closed containers or covered during transportation. The structural integrity of the waste containers must prevent leakage while in transit.
2. All vehicles transporting hazardous waste to or from the facility shall use Rawsonville Road to enter and exit the facility.
3. Vehicles transporting hazardous waste to or from the facility shall not park or stand on the I-94 Service Drive and
4. Following sampling at the facility, the trailer shall be closed/retarped; and shall remain closed while waiting to empty.

The main entrance of the site is clearly marked with an identification sign and there are signs, which instruct vehicle drivers how to proceed safely along the waste delivery corridor. Further verbal directions are provided to the driver at the Receiving Building when their paperwork is reviewed. A standard “Stop” sign is posted at the exit to the N. I-94 Service Drive.

A8.4 ACCESS ROAD SURFACING AND LOAD BEARING CAPACITY

Existing road construction:

A. Near garages and check-in trailers and west side of MC VI

1. Approximately 6 inches Asphalt Concrete
2. Approximately 1 ft. of broken concrete and aggregate
3. Native Sand

Refer to the attached reference material about this design method. The following variables are estimated as follows:

Traffic index: 10
Design life: (Assumed in method) 10 years

Material “R” values:

Native sand = 30
Compacted clay = 15
Broken concrete/Coarse aggregate = 70
Broken Concrete/wood = 60

Analysis of adequacy of construction:

A. Roads near garages, check-in trailers and along west side of MC VI

TI =10

Subgrade R=30

Base R=70

Gravel Equivalent(GE) for surfacing=0.0032(TI)(100-R)=0.0032(10)(100-70)=0.96

Gravel Equivalent factor(G_f)=2.5(5.14/TI)$^{0.5}$=1.79

Thickness of asphalt concrete=GE/G_f=0.96/1.79=0.54 ft =6.5 inches

6 inches of Asphalt were used

GE required for road base=0.0032(10)(100-30)=2.24

GE provided by asphalt=1.79 x 0.5=0.9

GE to be provided by road base=2.24-0.9=1.34

G_f for base(for R=70 material)=1.1

Thickness of base required=1.34/1.10=1.2 ft =14.6 inches

Approximately 12 inches of base used

Summary:

	Design(In.)	Existing(In.)
Asphalt	6.5	6
Broken Concrete and aggregate	14.5	~12

FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES PARTIAL DOCUMENT AS REFERENCE

(REVISED JANUARY 1973)

Acknowledgment
This revised guide was prepared through the cooperative efforts of the County Engineers Association of California, the league of California Cities and the California Division of Highways. Much appreciation is expressed to the various members and personnel of the above organizations who were responsible for the original design guide which was published in July 1968.

This revised version was prepared by George Sherman, Robert Smith, Joseph Hannon, George Dick and Karl Baumeister of the Materials and Research Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel, and Herman Woodruff of the City and County Liaison Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel and Herman Woodruff of the City and County Liaison Department of the California Division of Highways, and W.R. Lovering of the Asphalt Institute, for their review and comment. Appreciation is also extended to the City and County Engineers who have reviewed the rough draft and contributed to this publication by their suggestions.

Foreword

This booklet is intended to provide a concise and useful tool to the designer of city streets and county roads.

The information in this guide has been updated since the last printing in July 1968, but the concepts and methods used herein are not new. However, a new section has been added which covers the design of full depth asphalt concrete pavements.

The guide is based on the results of extensive studies, tests and numerous reports by various agencies concerning the many factors affecting the structural design of roadway sections.

This guide should prove quite helpful to many cities and counties irrespective of the amount or lack of laboratory facilities and testing equipment.

Suggestions for improvements to this guide may be directed to either the County Engineers Association of California or the League of California Cities.

Estimation of T.I. according to the road type

In the absence of more detailed knowledge, traffic may be estimated by considering the type of facility to be designed. Estimates of traffic made in this manner tend to be inaccurate, and for this reason, should allow for a safety factor. The estimated Traffic Index should be justified by a description of the facility, the area it serves, and the normal types of traffic carried. The table below lists several road categories and the T.I. which might be expected to correspond with these categories. The last four categories in the table are difficult to estimate. Since roads in these categories are more critical with regard to repair, due to heavier traffic, the T.I. should be estimated using either the standard method or the chart shown in figure 1.

Type of facility	T.I
Minor residential streets and cul-de-sacs	4
Residential streets	4.5
Residential collectors and minor or secondary collectors	5
Major or primary collectors providing for traffic movement between minor collectors and major aterials	6
Farm-to-market roads providing for the movement of traffic through agricultural areas to major arterials	5-7
Commercial roads(arterials serving areas which are primarily commercial in nature)	7-9
Connector roads(highways and arterials connecting two areas of relatively high population density)	7-9
Major city streets and thoroughfares and county highways	7-9
Streets and highways carrying heavy vehicle traffic. This would include streets in heavily industrialized areas	9+

Estimation of R-value using soil classification

Rough estimates of R-value can be made using some simple soil classification tests in conjunction with sand equivalent (SE) test. Each soil type (e.g. sandy clay, etc.) roughly encompasses a certain R-value range. The R-value range for a soil type may be narrowed by knowing more about the soil's plasticity and by knowing its sand equivalent value (Test method no. Calif 217). Soil classification sheets and triangular chart (Figures 3 and 4) are included as aids. To classify soils on the triangular chart (Figure 4), a sieve analysis and hydrometer analysis are necessary (Test Method Nos. Calif. 201, 202, and 203).

When the soil classification has been determined from figure 4, the chart in figure 5 may be used to approximate the R-Value. In this chart, the curves representing the various soil types show a stylized approximate frequency distribution of R-values for this particular type soil.

For fine grained materials, the upper tail or high R-value portion of the curve represents lower plasticity, relative to the soil type, while the lower tail represents soils of the same type having higher plasticity. The sand equivalent values provide additional subdivisions within the chart.

For a particular SE value, chances are good that the R-value for the same material will be as high or higher than the R-value designated by the corresponding dashed line. The converse, however, is not true since it is possible for a material to have a high R-value with a relatively low SE.

The curves for coarse-grained materials are affected in the same manner, by the presence of clay, with the lower tail representing materials with little or no clay, the lower tail represents hard, smooth-surfaced and poorly graded(well sorted) material while the upper tail represents rough-surfaced and well graded material.

The use of this chart must be tempered with good judgment and it should always be borne in mind that R-values obtained in this manner are estimations only. The reasoning behind these estimations should be fully documented in the materials report to provide to reviewers with as much basic data as possible.

Table of Contents

A.8 TRAFFIC INFORMATION

The internal road network, traffic pattern and control devices are shown in the engineering plans prepared by Midwestern Consulting, Inc. for the Wayne Disposal, Inc. Site #2 Landfill (WDI) (submitted in March 1995).

A8.1 INBOUND TRAFFIC

Vehicles enter the Site 2 – Michigan Disposal Waste Treatment Plant (MDWTP)/ Wayne Disposal, Inc. (WDI) facility through the main entrance area located at 49350 N. I-94 Service Drive, Belleville, pass the security guard at the gate and approach the Receiving Building by a path up the middle of a large, paved apron. All vehicles must stop at the Receiving Building for processing of manifests, other shipping documents. Unless special circumstances require otherwise, each bulk waste vehicle continues along this central corridor onto the vehicle scales for weigh-in. Bulk loads are inspected and sampled at this point whereas drums and containers must be unloaded at the destined location for inspection and sampling. Drivers are instructed to ensure the cover/tarp is then replaced to secure the load during the rest of the time that the bulk waste vehicle waits to be emptied.

After pre-acceptance procedures identified in Attachment C2 Chemical and Physical Waste Analysis Plan indicates that the shipment may be accepted, vehicles waiting to be offloaded are staged until they are unloaded. If the laboratory fingerprint indicates the load must be rejected, the vehicle circles the Receiving Building and then exits the site.

When operations are ready to unload the waste, the vehicle driver is instructed to proceed via the internal roadway system to the appropriate waste unloading area. Drivers are directed to offload their shipment to:

1. The MDWTP East Treatment Building or West Treatment Building;
2. The MDWTP Truck Dock;
3. The MDWTP Container Storage Areas;
4. The WDI loads designated to WDI.
5. The WDI container storage area

A8.2 OUTBOUND TRAFFIC

All empty bulk waste transporting vehicles will proceed through Site #2's wheel wash. Bulk waste vehicles then proceed to the outbound scales. The driver finalizes recordkeeping at the Receiving Building and then exits the site through the main gate.

On-site transfer of treatment residuals from MDWTP to WDI are routed north along the road immediately west of Master Cell VI (MC VI) to the unloading platform in of MC VI.

A8.3 ACCESS ROAD SURFACING, CONSTRUCTION, AND STRUCTURAL ANALYSIS

Load bearing capacity requirements were met by analyzing existing road conditions for adequacy of design. The results are as follows:

A. The roads around the reception/office area, maintenance buildings and along the west side of Master Cell VI are built on native, in-situ soils. Broken concrete and gravel were used for road base and this entire area is surfaced with asphalt. Calculations show this road section to be nearly identical to design requirements and its condition bears this out as it is performing quite well without distress.

B. The road leading to Master Cell VI is designed similar to the reception area roads (described in item A) and has adequate bearing capacity and strength.

A8.3(A)TRAFFIC CONTROL AND TRAFFIC SIGNALS

All waste transport companies which frequently use the facilities receive a written notification that:

1. Wastes shipped to the facility must be placed into closed containers or covered during transportation. The structural integrity of the waste containers must prevent leakage while in transit.
2. All vehicles transporting hazardous waste to or from the facility shall use Rawsonville Road to enter and exit the facility.
3. Vehicles transporting hazardous waste to or from the facility shall not park or stand on the I-94 Service Drive and
4. Following sampling at the facility, the trailer shall be closed/retarped; and shall remain closed while waiting to empty.

The main entrance of the site is clearly marked with an identification sign and there are signs, which instruct vehicle drivers how to proceed safely along the waste delivery corridor. Further verbal directions are provided to the driver at the Receiving Building when their paperwork is reviewed. A standard “Stop” sign is posted at the exit to the N. I-94 Service Drive.

A8.4 ACCESS ROAD SURFACING AND LOAD BEARING CAPACITY

Existing road construction:

A. Near garages and check-in trailers and west side of MC VI

1. Approximately 6 inches Asphalt Concrete
2. Approximately 1 ft. of broken concrete and aggregate
3. Native Sand

Refer to the attached reference material about this design method. The following variables are estimated as follows:

Traffic index: 10
Design life: (Assumed in method) 10 years

<u>Material “R” values</u>:

Native sand = 30
Compacted clay = 15
Broken concrete/Coarse aggregate = 70
Broken Concrete/wood = 60

Analysis of adequacy of construction:

A. Roads near garages, check-in trailers and along west side of MC VI

TI =10

Subgrade R=30

Base R=70

Gravel Equivalent(GE) for surfacing=0.0032(TI)(100-R)=0.0032(10)(100-70)=0.96

Gravel Equivalent factor(G_f)=2.5(5.14/TI)$^{0.5}$=1.79

Thickness of asphalt concrete=GE/G_f=0.96/1.79=0.54 ft =6.5 inches

6 inches of Asphalt were used

GE required for road base=0.0032(10)(100-30)=2.24

GE provided by asphalt=1.79 x 0.5=0.9

GE to be provided by road base=2.24-0.9=1.34

G_f for base(for R=70 material)=1.1

Thickness of base required=1.34/1.10=1.2 ft =14.6 inches

Approximately 12 inches of base used

Summary:

	Design(In.)	Existing(In.)
Asphalt	6.5	6
Broken Concrete and aggregate	14.5	~12

FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES PARTIAL DOCUMENT AS REFERENCE

(REVISED JANUARY 1973)

Acknowledgment
This revised guide was prepared through the cooperative efforts of the County Engineers Association of California, the league of California Cities and the California Division of Highways. Much appreciation is expressed to the various members and personnel of the above organizations who were responsible for the original design guide which was published in July 1968.

This revised version was prepared by George Sherman, Robert Smith, Joseph Hannon, George Dick and Karl Baumeister of the Materials and Research Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel, and Herman Woodruff of the City and County Liaison Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel and Herman Woodruff of the City and County Liaison Department of the California Division of Highways, and W.R. Lovering of the Asphalt Institute, for their review and comment. Appreciation is also extended to the City and County Engineers who have reviewed the rough draft and contributed to this publication by their suggestions.

Foreword

This booklet is intended to provide a concise and useful tool to the designer of city streets and county roads.

The information in this guide has been updated since the last printing in July 1968, but the concepts and methods used herein are not new. However, a new section has been added which covers the design of full depth asphalt concrete pavements.

The guide is based on the results of extensive studies, tests and numerous reports by various agencies concerning the many factors affecting the structural design of roadway sections.

This guide should prove quite helpful to many cities and counties irrespective of the amount or lack of laboratory facilities and testing equipment.

Suggestions for improvements to this guide may be directed to either the County Engineers Association of California or the League of California Cities.

Estimation of T.I. according to the road type

In the absence of more detailed knowledge, traffic may be estimated by considering the type of facility to be designed. Estimates of traffic made in this manner tend to be inaccurate, and for this reason, should allow for a safety factor. The estimated Traffic Index should be justified by a description of the facility, the area it serves, and the normal types of traffic carried. The table below lists several road categories and the T.I. which might be expected to correspond with these categories. The last four categories in the table are difficult to estimate. Since roads in these categories are more critical with regard to repair, due to heavier traffic, the T.I. should be estimated using either the standard method or the chart shown in figure 1.

Type of facility	**T.I**
Minor residential streets and cul-de-sacs	4
Residential streets	4.5
Residential collectors and minor or secondary collectors	5
Major or primary collectors providing for traffic movement between minor collectors and major aterials	6
Farm-to-market roads providing for the movement of traffic through agricultural areas to major arterials	5-7
Commercial roads(arterials serving areas which are primarily commercial in nature)	7-9
Connector roads(highways and arterials connecting two areas of relatively high population density)	7-9
Major city streets and thoroughfares and county highways	7-9
Streets and highways carrying heavy vehicle traffic. This would include streets in heavily industrialized areas	9+

Estimation of R-value using soil classification

Rough estimates of R-value can be made using some simple soil classification tests in conjunction with sand equivalent (SE) test. Each soil type (e.g. sandy clay, etc.) roughly encompasses a certain R-value range. The R-value range for a soil type may be narrowed by knowing more about the soil's plasticity and by knowing its sand equivalent value (Test method no. Calif 217). Soil classification sheets and triangular chart (Figures 3 and 4) are included as aids. To classify soils on the triangular chart (Figure 4), a sieve analysis and hydrometer analysis are necessary (Test Method Nos. Calif. 201, 202, and 203).

When the soil classification has been determined from figure 4, the chart in figure 5 may be used to approximate the R-Value. In this chart, the curves representing the various soil types show a stylized approximate frequency distribution of R-values for this particular type soil.

For fine grained materials, the upper tail or high R-value portion of the curve represents lower plasticity, relative to the soil type, while the lower tail represents soils of the same type having higher plasticity. The sand equivalent values provide additional subdivisions within the chart.

For a particular SE value, chances are good that the R-value for the same material will be as high or higher than the R-value designated by the corresponding dashed line. The converse, however, is not true since it is possible for a material to have a high R-value with a relatively low SE.

The curves for coarse-grained materials are affected in the same manner, by the presence of clay, with the lower tail representing materials with little or no clay, the lower tail represents hard, smooth-surfaced and poorly graded(well sorted) material while the upper tail represents rough-surfaced and well graded material.

The use of this chart must be tempered with good judgment and it should always be borne in mind that R-values obtained in this manner are estimations only. The reasoning behind these estimations should be fully documented in the materials report to provide to reviewers with as much basic data as possible.

Table of Contents

A.8 TRAFFIC INFORMATION

The internal road network, traffic pattern and control devices are shown in the engineering plans prepared by Midwestern Consulting, Inc. for the Wayne Disposal, Inc. Site #2 Landfill (WDI) (submitted in March 1995).

A8.1 INBOUND TRAFFIC

Vehicles enter the Site 2 – Michigan Disposal Waste Treatment Plant (MDWTP)/ Wayne Disposal, Inc. (WDI) facility through the main entrance area located at 49350 N. I-94 Service Drive, Belleville, pass the security guard at the gate and approach the Receiving Building by a path up the middle of a large, paved apron. All vehicles must stop at the Receiving Building for processing of manifests, other shipping documents. Unless special circumstances require otherwise, each bulk waste vehicle continues along this central corridor onto the vehicle scales for weigh-in. Bulk loads are inspected and sampled at this point whereas drums and containers must be unloaded at the destined location for inspection and sampling. Drivers are instructed to ensure the cover/tarp is then replaced to secure the load during the rest of the time that the bulk waste vehicle waits to be emptied.

After pre-acceptance procedures identified in Attachment C2 Chemical and Physical Waste Analysis Plan indicates that the shipment may be accepted, vehicles waiting to be offloaded are staged until they are unloaded. If the laboratory fingerprint indicates the load must be rejected, the vehicle circles the Receiving Building and then exits the site.

When operations are ready to unload the waste, the vehicle driver is instructed to proceed via the internal roadway system to the appropriate waste unloading area. Drivers are directed to offload their shipment to:

1. The MDWTP East Treatment Building or West Treatment Building;
2. The MDWTP Truck Dock;
3. The MDWTP Container Storage Areas;
4. The WDI loads designated to WDI.
5. The WDI container storage area

A8.2 OUTBOUND TRAFFIC

All empty bulk waste transporting vehicles will proceed through Site #2's wheel wash. Bulk waste vehicles then proceed to the outbound scales. The driver finalizes recordkeeping at the Receiving Building and then exits the site through the main gate.

On-site transfer of treatment residuals from MDWTP to WDI are routed north along the road immediately west of Master Cell VI (MC VI) to the unloading platform in of MC VI.

A8.3 ACCESS ROAD SURFACING, CONSTRUCTION, AND STRUCTURAL ANALYSIS

Load bearing capacity requirements were met by analyzing existing road conditions for adequacy of design. The results are as follows:

A. The roads around the reception/office area, maintenance buildings and along the west side of Master Cell VI are built on native, in-situ soils. Broken concrete and gravel were used for road base and this entire area is surfaced with asphalt. Calculations show this road section to be nearly identical to design requirements and its condition bears this out as it is performing quite well without distress.

B. The road leading to Master Cell VI is designed similar to the reception area roads (described in item A) and has adequate bearing capacity and strength.

A8.3(A)TRAFFIC CONTROL AND TRAFFIC SIGNALS

All waste transport companies which frequently use the facilities receive a written notification that:

1. Wastes shipped to the facility must be placed into closed containers or covered during transportation. The structural integrity of the waste containers must prevent leakage while in transit.
2. All vehicles transporting hazardous waste to or from the facility shall use Rawsonville Road to enter and exit the facility.
3. Vehicles transporting hazardous waste to or from the facility shall not park or stand on the I-94 Service Drive and
4. Following sampling at the facility, the trailer shall be closed/retarped; and shall remain closed while waiting to empty.

The main entrance of the site is clearly marked with an identification sign and there are signs, which instruct vehicle drivers how to proceed safely along the waste delivery corridor. Further verbal directions are provided to the driver at the Receiving Building when their paperwork is reviewed. A standard “Stop” sign is posted at the exit to the N. I-94 Service Drive.

A8.4 ACCESS ROAD SURFACING AND LOAD BEARING CAPACITY

Existing road construction:

A. Near garages and check-in trailers and west side of MC VI

1. Approximately 6 inches Asphalt Concrete
2. Approximately 1 ft. of broken concrete and aggregate
3. Native Sand

Refer to the attached reference material about this design method. The following variables are estimated as follows:

Traffic index: 10
Design life: (Assumed in method) 10 years

<u>Material “R” values</u>:

Native sand = 30
Compacted clay = 15
Broken concrete/Coarse aggregate = 70
Broken Concrete/wood = 60

Analysis of adequacy of construction:

A. Roads near garages, check-in trailers and along west side of MC VI

TI =10

Subgrade R=30

Base R=70

Gravel Equivalent(GE) for surfacing=0.0032(TI)(100-R)=0.0032(10)(100-70)=0.96

Gravel Equivalent factor(G_f)=2.5(5.14/TI)$^{0.5}$=1.79

Thickness of asphalt concrete=GE/G_f=0.96/1.79=0.54 ft =6.5 inches

6 inches of Asphalt were used

GE required for road base=0.0032(10)(100-30)=2.24

GE provided by asphalt=1.79 x 0.5=0.9

GE to be provided by road base=2.24-0.9=1.34

G_f for base(for R=70 material)=1.1

Thickness of base required=1.34/1.10=1.2 ft =14.6 inches

Approximately 12 inches of base used

Summary:

	Design(In.)	Existing(In.)
Asphalt	6.5	6
Broken Concrete and aggregate	14.5	~12

FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES PARTIAL DOCUMENT AS REFERENCE

(REVISED JANUARY 1973)

Acknowledgment

This revised guide was prepared through the cooperative efforts of the County Engineers Association of California, the league of California Cities and the California Division of Highways. Much appreciation is expressed to the various members and personnel of the above organizations who were responsible for the original design guide which was published in July 1968.

This revised version was prepared by George Sherman, Robert Smith, Joseph Hannon, George Dick and Karl Baumeister of the Materials and Research Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel, and Herman Woodruff of the City and County Liaison Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel and Herman Woodruff of the City and County Liaison Department of the California Division of Highways, and W.R. Lovering of the Asphalt Institute, for their review and comment. Appreciation is also extended to the City and County Engineers who have reviewed the rough draft and contributed to this publication by their suggestions.

Foreword

This booklet is intended to provide a concise and useful tool to the designer of city streets and county roads.

The information in this guide has been updated since the last printing in July 1968, but the concepts and methods used herein are not new. However, a new section has been added which covers the design of full depth asphalt concrete pavements.

The guide is based on the results of extensive studies, tests and numerous reports by various agencies concerning the many factors affecting the structural design of roadway sections.

This guide should prove quite helpful to many cities and counties irrespective of the amount or lack of laboratory facilities and testing equipment.

Suggestions for improvements to this guide may be directed to either the County Engineers Association of California or the League of California Cities.

Estimation of T.I. according to the road type

In the absence of more detailed knowledge, traffic may be estimated by considering the type of facility to be designed. Estimates of traffic made in this manner tend to be inaccurate, and for this reason, should allow for a safety factor. The estimated Traffic Index should be justified by a description of the facility, the area it serves, and the normal types of traffic carried. The table below lists several road categories and the T.I. which might be expected to correspond with these categories. The last four categories in the table are difficult to estimate. Since roads in these categories are more critical with regard to repair, due to heavier traffic, the T.I. should be estimated using either the standard method or the chart shown in figure 1.

Type of facility	**T.I**
Minor residential streets and cul-de-sacs	4
Residential streets	4.5
Residential collectors and minor or secondary collectors	5
Major or primary collectors providing for traffic movement between minor collectors and major aterials	6
Farm-to-market roads providing for the movement of traffic through agricultural areas to major arterials	5-7
Commercial roads(arterials serving areas which are primarily commercial in nature)	7-9
Connector roads(highways and arterials connecting two areas of relatively high population density)	7-9
Major city streets and thoroughfares and county highways	7-9
Streets and highways carrying heavy vehicle traffic. This would include streets in heavily industrialized areas	9+

Estimation of R-value using soil classification

Rough estimates of R-value can be made using some simple soil classification tests in conjunction with sand equivalent (SE) test. Each soil type (e.g. sandy clay, etc.) roughly encompasses a certain R-value range. The R-value range for a soil type may be narrowed by knowing more about the soil's plasticity and by knowing its sand equivalent value (Test method no. Calif 217). Soil classification sheets and triangular chart (Figures 3 and 4) are included as aids. To classify soils on the triangular chart (Figure 4), a sieve analysis and hydrometer analysis are necessary (Test Method Nos. Calif. 201, 202, and 203).

When the soil classification has been determined from figure 4, the chart in figure 5 may be used to approximate the R-Value. In this chart, the curves representing the various soil types show a stylized approximate frequency distribution of R-values for this particular type soil.

For fine grained materials, the upper tail or high R-value portion of the curve represents lower plasticity, relative to the soil type, while the lower tail represents soils of the same type having higher plasticity. The sand equivalent values provide additional subdivisions within the chart.

For a particular SE value, chances are good that the R-value for the same material will be as high or higher than the R-value designated by the corresponding dashed line. The converse, however, is not true since it is possible for a material to have a high R-value with a relatively low SE.

The curves for coarse-grained materials are affected in the same manner, by the presence of clay, with the lower tail representing materials with little or no clay, the lower tail represents hard, smooth-surfaced and poorly graded(well sorted) material while the upper tail represents rough-surfaced and well graded material.

The use of this chart must be tempered with good judgment and it should always be borne in mind that R-values obtained in this manner are estimations only. The reasoning behind these estimations should be fully documented in the materials report to provide to reviewers with as much basic data as possible.

Table of Contents

A.8 TRAFFIC INFORMATION

The internal road network, traffic pattern and control devices are shown in the engineering plans prepared by Midwestern Consulting, Inc. for the Wayne Disposal, Inc. Site #2 Landfill (WDI) (submitted in March 1995).

A8.1 INBOUND TRAFFIC

Vehicles enter the Site 2 – Michigan Disposal Waste Treatment Plant (MDWTP)/ Wayne Disposal, Inc. (WDI) facility through the main entrance area located at 49350 N. I-94 Service Drive, Belleville, pass the security guard at the gate and approach the Receiving Building by a path up the middle of a large, paved apron. All vehicles must stop at the Receiving Building for processing of manifests, other shipping documents. Unless special circumstances require otherwise, each bulk waste vehicle continues along this central corridor onto the vehicle scales for weigh-in. Bulk loads are inspected and sampled at this point whereas drums and containers must be unloaded at the destined location for inspection and sampling. Drivers are instructed to ensure the cover/tarp is then replaced to secure the load during the rest of the time that the bulk waste vehicle waits to be emptied.

After pre-acceptance procedures identified in Attachment C2 Chemical and Physical Waste Analysis Plan indicates that the shipment may be accepted, vehicles waiting to be offloaded are staged until they are unloaded. If the laboratory fingerprint indicates the load must be rejected, the vehicle circles the Receiving Building and then exits the site.

When operations are ready to unload the waste, the vehicle driver is instructed to proceed via the internal roadway system to the appropriate waste unloading area. Drivers are directed to offload their shipment to:

1. The MDWTP East Treatment Building or West Treatment Building;
2. The MDWTP Truck Dock;
3. The MDWTP Container Storage Areas;
4. The WDI loads designated to WDI.
5. The WDI container storage area

A8.2 OUTBOUND TRAFFIC

All empty bulk waste transporting vehicles will proceed through Site #2's wheel wash. Bulk waste vehicles then proceed to the outbound scales. The driver finalizes recordkeeping at the Receiving Building and then exits the site through the main gate.

On-site transfer of treatment residuals from MDWTP to WDI are routed north along the road immediately west of Master Cell VI (MC VI) to the unloading platform in of MC VI.

A8.3 ACCESS ROAD SURFACING, CONSTRUCTION, AND STRUCTURAL ANALYSIS

Load bearing capacity requirements were met by analyzing existing road conditions for adequacy of design. The results are as follows:

A. The roads around the reception/office area, maintenance buildings and along the west side of Master Cell VI are built on native, in-situ soils. Broken concrete and gravel were used for road base and this entire area is surfaced with asphalt. Calculations show this road section to be nearly identical to design requirements and its condition bears this out as it is performing quite well without distress.

B. The road leading to Master Cell VI is designed similar to the reception area roads (described in item A) and has adequate bearing capacity and strength.

A8.3(A)TRAFFIC CONTROL AND TRAFFIC SIGNALS

All waste transport companies which frequently use the facilities receive a written notification that:

1. Wastes shipped to the facility must be placed into closed containers or covered during transportation. The structural integrity of the waste containers must prevent leakage while in transit.
2. All vehicles transporting hazardous waste to or from the facility shall use Rawsonville Road to enter and exit the facility.
3. Vehicles transporting hazardous waste to or from the facility shall not park or stand on the I-94 Service Drive and
4. Following sampling at the facility, the trailer shall be closed/retarped; and shall remain closed while waiting to empty.

The main entrance of the site is clearly marked with an identification sign and there are signs, which instruct vehicle drivers how to proceed safely along the waste delivery corridor. Further verbal directions are provided to the driver at the Receiving Building when their paperwork is reviewed. A standard "Stop" sign is posted at the exit to the N. I-94 Service Drive.

A8.4 ACCESS ROAD SURFACING AND LOAD BEARING CAPACITY

Existing road construction:

A. Near garages and check-in trailers and west side of MC VI

1. Approximately 6 inches Asphalt Concrete
2. Approximately 1 ft. of broken concrete and aggregate
3. Native Sand

Refer to the attached reference material about this design method. The following variables are estimated as follows:

Traffic index: 10
Design life: (Assumed in method) 10 years

Material "R" values:

Native sand = 30
Compacted clay = 15
Broken concrete/Coarse aggregate = 70
Broken Concrete/wood = 60

Analysis of adequacy of construction:

A. Roads near garages, check-in trailers and along west side of MC VI

TI =10

Subgrade R=30

Base R=70

Gravel Equivalent(GE) for surfacing=0.0032(TI)(100-R)=0.0032(10)(100-70)=0.96

Gravel Equivalent factor(G_f)=2.5(5.14/TI)$^{0.5}$=1.79

Thickness of asphalt concrete=GE/G_f=0.96/1.79=0.54 ft =6.5 inches

6 inches of Asphalt were used

GE required for road base=0.0032(10)(100-30)=2.24

GE provided by asphalt=1.79 x 0.5=0.9

GE to be provided by road base=2.24-0.9=1.34

G_f for base(for R=70 material)=1.1

Thickness of base required=1.34/1.10=1.2 ft =14.6 inches

Approximately 12 inches of base used

Summary:

	Design(In.)	Existing(In.)
Asphalt	6.5	6
Broken Concrete and aggregate	14.5	~12

FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES PARTIAL DOCUMENT AS REFERENCE

(REVISED JANUARY 1973)

Acknowledgment
This revised guide was prepared through the cooperative efforts of the County Engineers Association of California, the league of California Cities and the California Division of Highways. Much appreciation is expressed to the various members and personnel of the above organizations who were responsible for the original design guide which was published in July 1968.

This revised version was prepared by George Sherman, Robert Smith, Joseph Hannon, George Dick and Karl Baumeister of the Materials and Research Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel, and Herman Woodruff of the City and County Liaison Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel and Herman Woodruff of the City and County Liaison Department of the California Division of Highways, and W.R. Lovering of the Asphalt Institute, for their review and comment. Appreciation is also extended to the City and County Engineers who have reviewed the rough draft and contributed to this publication by their suggestions.

Foreword

This booklet is intended to provide a concise and useful tool to the designer of city streets and county roads.

The information in this guide has been updated since the last printing in July 1968, but the concepts and methods used herein are not new. However, a new section has been added which covers the design of full depth asphalt concrete pavements.

The guide is based on the results of extensive studies, tests and numerous reports by various agencies concerning the many factors affecting the structural design of roadway sections.

This guide should prove quite helpful to many cities and counties irrespective of the amount or lack of laboratory facilities and testing equipment.

Suggestions for improvements to this guide may be directed to either the County Engineers Association of California or the League of California Cities.

Estimation of T.I. according to the road type

In the absence of more detailed knowledge, traffic may be estimated by considering the type of facility to be designed. Estimates of traffic made in this manner tend to be inaccurate, and for this reason, should allow for a safety factor. The estimated Traffic Index should be justified by a description of the facility, the area it serves, and the normal types of traffic carried. The table below lists several road categories and the T.I. which might be expected to correspond with these categories. The last four categories in the table are difficult to estimate. Since roads in these categories are more critical with regard to repair, due to heavier traffic, the T.I. should be estimated using either the standard method or the chart shown in figure 1.

Type of facility	**T.I**
Minor residential streets and cul-de-sacs	4
Residential streets	4.5
Residential collectors and minor or secondary collectors	5
Major or primary collectors providing for traffic movement between minor collectors and major aterials	6
Farm-to-market roads providing for the movement of traffic through agricultural areas to major arterials	5-7
Commercial roads(arterials serving areas which are primarily commercial in nature)	7-9
Connector roads(highways and arterials connecting two areas of relatively high population density)	7-9
Major city streets and thoroughfares and county highways	7-9
Streets and highways carrying heavy vehicle traffic. This would include streets in heavily industrialized areas	9+

Estimation of R-value using soil classification

Rough estimates of R-value can be made using some simple soil classification tests in conjunction with sand equivalent (SE) test. Each soil type (e.g. sandy clay, etc.) roughly encompasses a certain R-value range. The R-value range for a soil type may be narrowed by knowing more about the soil's plasticity and by knowing its sand equivalent value (Test method no. Calif 217). Soil classification sheets and triangular chart (Figures 3 and 4) are included as aids. To classify soils on the triangular chart (Figure 4), a sieve analysis and hydrometer analysis are necessary (Test Method Nos. Calif. 201, 202, and 203).

When the soil classification has been determined from figure 4, the chart in figure 5 may be used to approximate the R-Value. In this chart, the curves representing the various soil types show a stylized approximate frequency distribution of R-values for this particular type soil.

For fine grained materials, the upper tail or high R-value portion of the curve represents lower plasticity, relative to the soil type, while the lower tail represents soils of the same type having higher plasticity. The sand equivalent values provide additional subdivisions within the chart.

For a particular SE value, chances are good that the R-value for the same material will be as high or higher than the R-value designated by the corresponding dashed line. The converse, however, is not true since it is possible for a material to have a high R-value with a relatively low SE.

The curves for coarse-grained materials are affected in the same manner, by the presence of clay, with the lower tail representing materials with little or no clay, the lower tail represents hard, smooth-surfaced and poorly graded(well sorted) material while the upper tail represents rough-surfaced and well graded material.

The use of this chart must be tempered with good judgment and it should always be borne in mind that R-values obtained in this manner are estimations only. The reasoning behind these estimations should be fully documented in the materials report to provide to reviewers with as much basic data as possible.

Table of Contents

A.8 TRAFFIC INFORMATION

The internal road network, traffic pattern and control devices are shown in the engineering plans prepared by Midwestern Consulting, Inc. for the Wayne Disposal, Inc. Site #2 Landfill (WDI) (submitted in March 1995).

A8.1 INBOUND TRAFFIC

Vehicles enter the Site 2 – Michigan Disposal Waste Treatment Plant (MDWTP)/ Wayne Disposal, Inc. (WDI) facility through the main entrance area located at 49350 N. I-94 Service Drive, Belleville, pass the security guard at the gate and approach the Receiving Building by a path up the middle of a large, paved apron. All vehicles must stop at the Receiving Building for processing of manifests, other shipping documents. Unless special circumstances require otherwise, each bulk waste vehicle continues along this central corridor onto the vehicle scales for weigh-in. Bulk loads are inspected and sampled at this point whereas drums and containers must be unloaded at the destined location for inspection and sampling. Drivers are instructed to ensure the cover/tarp is then replaced to secure the load during the rest of the time that the bulk waste vehicle waits to be emptied.

After pre-acceptance procedures identified in Attachment C2 Chemical and Physical Waste Analysis Plan indicates that the shipment may be accepted, vehicles waiting to be offloaded are staged until they are unloaded. If the laboratory fingerprint indicates the load must be rejected, the vehicle circles the Receiving Building and then exits the site.

When operations are ready to unload the waste, the vehicle driver is instructed to proceed via the internal roadway system to the appropriate waste unloading area. Drivers are directed to offload their shipment to:

1. The MDWTP East Treatment Building or West Treatment Building;
2. The MDWTP Truck Dock;
3. The MDWTP Container Storage Areas;
4. The WDI loads designated to WDI.
5. The WDI container storage area

A8.2 OUTBOUND TRAFFIC

All empty bulk waste transporting vehicles will proceed through Site #2’s wheel wash. Bulk waste vehicles then proceed to the outbound scales. The driver finalizes recordkeeping at the Receiving Building and then exits the site through the main gate.

On-site transfer of treatment residuals from MDWTP to WDI are routed north along the road immediately west of Master Cell VI (MC VI) to the unloading platform in of MC VI.

A8.3 ACCESS ROAD SURFACING, CONSTRUCTION, AND STRUCTURAL ANALYSIS

Load bearing capacity requirements were met by analyzing existing road conditions for adequacy of design. The results are as follows:

A. The roads around the reception/office area, maintenance buildings and along the west side of Master Cell VI are built on native, in-situ soils. Broken concrete and gravel were used for road base and this entire area is surfaced with asphalt. Calculations show this road section to be nearly identical to design requirements and its condition bears this out as it is performing quite well without distress.

B. The road leading to Master Cell VI is designed similar to the reception area roads (described in item A) and has adequate bearing capacity and strength.

A8.3(A)TRAFFIC CONTROL AND TRAFFIC SIGNALS

All waste transport companies which frequently use the facilities receive a written notification that:

1. Wastes shipped to the facility must be placed into closed containers or covered during transportation. The structural integrity of the waste containers must prevent leakage while in transit.
2. All vehicles transporting hazardous waste to or from the facility shall use Rawsonville Road to enter and exit the facility.
3. Vehicles transporting hazardous waste to or from the facility shall not park or stand on the I-94 Service Drive and
4. Following sampling at the facility, the trailer shall be closed/retarped; and shall remain closed while waiting to empty.

The main entrance of the site is clearly marked with an identification sign and there are signs, which instruct vehicle drivers how to proceed safely along the waste delivery corridor. Further verbal directions are provided to the driver at the Receiving Building when their paperwork is reviewed. A standard “Stop” sign is posted at the exit to the N. I-94 Service Drive.

A8.4 ACCESS ROAD SURFACING AND LOAD BEARING CAPACITY

Existing road construction:

A. Near garages and check-in trailers and west side of MC VI

1. Approximately 6 inches Asphalt Concrete
2. Approximately 1 ft. of broken concrete and aggregate
3. Native Sand

Refer to the attached reference material about this design method. The following variables are estimated as follows:

Traffic index: 10
Design life: (Assumed in method) 10 years

Material “R” values:

Native sand = 30
Compacted clay = 15
Broken concrete/Coarse aggregate = 70
Broken Concrete/wood = 60

Analysis of adequacy of construction:

A. Roads near garages, check-in trailers and along west side of MC VI

TI =10

Subgrade R=30

Base R=70

Gravel Equivalent(GE) for surfacing=0.0032(TI)(100-R)=0.0032(10)(100-70)=0.96

Gravel Equivalent factor(G_f)=2.5(5.14/TI)$^{0.5}$=1.79

Thickness of asphalt concrete=GE/G_f=0.96/1.79=0.54 ft =6.5 inches

6 inches of Asphalt were used

GE required for road base=0.0032(10)(100-30)=2.24

GE provided by asphalt=1.79 x 0.5=0.9

GE to be provided by road base=2.24-0.9=1.34

G_f for base(for R=70 material)=1.1

Thickness of base required=1.34/1.10=1.2 ft =14.6 inches

Approximately 12 inches of base used

Summary:

	Design(In.)	Existing(In.)
Asphalt	6.5	6
Broken Concrete and aggregate	14.5	~12

FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES PARTIAL DOCUMENT AS REFERENCE

(REVISED JANUARY 1973)

Acknowledgment
This revised guide was prepared through the cooperative efforts of the County Engineers Association of California, the league of California Cities and the California Division of Highways. Much appreciation is expressed to the various members and personnel of the above organizations who were responsible for the original design guide which was published in July 1968.

This revised version was prepared by George Sherman, Robert Smith, Joseph Hannon, George Dick and Karl Baumeister of the Materials and Research Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel, and Herman Woodruff of the City and County Liaison Department of the California Division of Highways. Credit should also be shared with Paul Wagner and George Ebenhack of the Design Department, Jack Kassel and Herman Woodruff of the City and County Liaison Department of the California Division of Highways, and W.R. Lovering of the Asphalt Institute, for their review and comment. Appreciation is also extended to the City and County Engineers who have reviewed the rough draft and contributed to this publication by their suggestions.

Foreword

This booklet is intended to provide a concise and useful tool to the designer of city streets and county roads.

The information in this guide has been updated since the last printing in July 1968, but the concepts and methods used herein are not new. However, a new section has been added which covers the design of full depth asphalt concrete pavements.

The guide is based on the results of extensive studies, tests and numerous reports by various agencies concerning the many factors affecting the structural design of roadway sections.

This guide should prove quite helpful to many cities and counties irrespective of the amount or lack of laboratory facilities and testing equipment.

Suggestions for improvements to this guide may be directed to either the County Engineers Association of California or the League of California Cities.

Estimation of T.I. according to the road type

In the absence of more detailed knowledge, traffic may be estimated by considering the type of facility to be designed. Estimates of traffic made in this manner tend to be inaccurate, and for this reason, should allow for a safety factor. The estimated Traffic Index should be justified by a description of the facility, the area it serves, and the normal types of traffic carried. The table below lists several road categories and the T.I. which might be expected to correspond with these categories. The last four categories in the table are difficult to estimate. Since roads in these categories are more critical with regard to repair, due to heavier traffic, the T.I. should be estimated using either the standard method or the chart shown in figure 1.

Type of facility	**T.I**
Minor residential streets and cul-de-sacs	4
Residential streets	4.5
Residential collectors and minor or secondary collectors	5
Major or primary collectors providing for traffic movement between minor collectors and major aterials	6
Farm-to-market roads providing for the movement of traffic through agricultural areas to major arterials	5-7
Commercial roads(arterials serving areas which are primarily commercial in nature)	7-9
Connector roads(highways and arterials connecting two areas of relatively high population density)	7-9
Major city streets and thoroughfares and county highways	7-9
Streets and highways carrying heavy vehicle traffic. This would include streets in heavily industrialized areas	9+

Estimation of R-value using soil classification

Rough estimates of R-value can be made using some simple soil classification tests in conjunction with sand equivalent (SE) test. Each soil type (e.g. sandy clay, etc.) roughly encompasses a certain R-value range. The R-value range for a soil type may be narrowed by knowing more about the soil's plasticity and by knowing its sand equivalent value (Test method no. Calif 217). Soil classification sheets and triangular chart (Figures 3 and 4) are included as aids. To classify soils on the triangular chart (Figure 4), a sieve analysis and hydrometer analysis are necessary (Test Method Nos. Calif. 201, 202, and 203).

When the soil classification has been determined from figure 4, the chart in figure 5 may be used to approximate the R-Value. In this chart, the curves representing the various soil types show a stylized approximate frequency distribution of R-values for this particular type soil.

For fine grained materials, the upper tail or high R-value portion of the curve represents lower plasticity, relative to the soil type, while the lower tail represents soils of the same type having higher plasticity. The sand equivalent values provide additional subdivisions within the chart.

For a particular SE value, chances are good that the R-value for the same material will be as high or higher than the R-value designated by the corresponding dashed line. The converse, however, is not true since it is possible for a material to have a high R-value with a relatively low SE.

The curves for coarse-grained materials are affected in the same manner, by the presence of clay, with the lower tail representing materials with little or no clay, the lower tail represents hard, smooth-surfaced and poorly graded(well sorted) material while the upper tail represents rough-surfaced and well graded material.

The use of this chart must be tempered with good judgment and it should always be borne in mind that R-values obtained in this manner are estimations only. The reasoning behind these estimations should be fully documented in the materials report to provide to reviewers with as much basic data as possible.