



INTERNATIONAL

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DEVICES

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Volume II, Further Studies

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Brian Clearman

Mount Angel Abbey 2004

Dedicated to the Memory of

RBC

1941-1958

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TABLE OF CONTENTS

PREFACE	10
CHAPTER 1	
THE DEVELOPMENT OF TRAFFIC CONTROL DEVICES, 1909-1950	
A European Traffic Signs	
1 Introduction	15
2 European Traffic Signs, 1909-1926-1931	17
3 The Old British System (OBS), 1903-1950	23
B Final League of Nations/Initial United Nations Traffic Signs System	
1 Introduction and League of Nations, 1938-1939	26
2 United Nations Protocol 1949	35
C Traffic Signs Developments in Africa/Middle East/ Asia/Pacific/Americas 1925-1950	
1 Early Africa/Middle East/Asia/Pacific/Americas	40
a) The Americas	40
b) Africa/Middle East/Asia/Pacific	43
2 More Recent Africa: CASATC	46
D Traffic Signals & Traffic Markings To 1950	
1 Introduction	53
2 Traffic Signals	53
3 Traffic Markings	56
CHAPTER 2	
CLASSIFICATION WITH EXPLANATORY NOTES	
A The Classification Revisited	
1 Introduction to Chapter 2	59
2 The Revisiting of the Classification	60

- a) The 4th Digit Problem: Aids Affected by it/Aids not Affected by it
- b) Classifying Principle: 4th-Digit May Represent Categories not Separate Aids
- 3 Changes in Classification Messages

B Classification & Notes

- 1 The Main Classification
- 2 Explanatory Notes
 - General Note
- 3 Variant Classification for TCD
 - General Note

CHAPTER 3

TRAFFIC SIGNALS WITH INTRODUCTION TO ENTITIES SPONSORING SIGNALS

A Introduction

- 1 Introduction to Chapter
- 2 The UN Draft Convention, 1952
- 3 The IAMM of TCDs
- 4 Code for TCD, ECAFE
- 5 Outgrowths of the 1952 Draft Convention
- 6 Changes and Reformation of Older Systems, 1950-1967
 - a) Introduction & United Kingdom
 - b) Scandinavia
 - c) Canadian TCDs
 - d) The United States
 - e) The Threshold of 1968: Divergence and Unity

B Traffic Signals

- 1 Introduction & Traffic Signal Before 1968
 - a) Introduction
 - b) Terms
 - c) Traffic Signals, 1952-1967
- 2 Traffic Signals: 1968 and After

60

62

64

66

68

74

75

79

80

81

83

85

86

87

89

89

90

91

93

94

95

- a) Documents Preceding UN 1968 96
- b) 1968 UN Conference: Traffic Signal Messages 98
- c) Changes After 1968: Europe and North America 100

CHAPTER 4

WARNING & INFORMATIVE SIGNS

A Warning Signs, 1952-1968

- 1 Introduction 103
- 2 1952-1967 104
- 3 UN 1968 Danger Warning Signs 106
- 4 Regional & National Changes & Implementations 111

B Informative Signs

- 1 Introduction 114
- 2 Informative Signs, 1952-1967 114
- 3 UN 1968 and Informative Signs
 - a) Changes in Drafts 116
 - b) Signs in UN 1968 118
 - c) Aftermath of UN 1968: Implementation & Changes 122

CHAPTER 5

REGULATORY SIGNS

A Regulatory Signs Before 1968

- 1 Introduction 126
- 2 Regulatory Signs, 1952-1967 127

B UN 1968 & Aftermath

- 1 The Building of the UN System 131
- 2 The Problem of the Red Oblique Bar 135
- 3 Regulatory Signs at UN 1968 143
- 4 Aftermath of UN 1968: Regulatory Signs 147

CHAPTER 6
TRAFFIC MARKINGS

- A Introduction & Traffic Markings Before 1968
 - 1 Introduction: Terms, Classification, Overview
 - 2 Traffic Markings, 1952-1967

- B UN 1968: Traffic Markings
 - 1 Review of Drafts
 - 2 UN 1968 Provisions
 - 3 Aftermath of UN 1968

APPENDIX I
GLOSSARY OF TERMS

- i Classification System Terms
- ii Message Characteristics Terms
- iii Marking Types Terms
- iv Transportation Terms
- v Political Terms

APPENDIX II
A COMPARATIVE REVIEW OF INTERNATIONAL
ROAD SIGNS, 1909-1968

- i Introduction
- ii The Chart
- iii Explanatory Notes

- iv Sign Shapes and Color Formats 199
 - a) Sign Shape Illustrations 200
 - b) Sign Shapes 208
 - c) Systems Use of Color 210

BIBLIOGRAPHY

- i Abbreviations for Sources 217
- ii Books, Journals & Reports (Non-Governmental Sources) 219
- iii UN Sources
 - a) UN Conference on Road Traffic 221
 - b) Other UN Sources 222
- iv Other Government Sources 223

INDEXES

- General Index 227
- Index of Names 231
- Index of T-M Phenomena 237

PREFACE FOR SECOND EDITION

This edition of Part E prepared nearly 20 years after the 1st edition offers a significant change in direction. The 1st edition focussed on TCD systems (with a historical undergirding). Traffic Signs, Traffic Signals, Traffic Markings played a secondary role in that edition. In this edition the focus is on T-M forms before systems. History and systems are present but in a more secondary role.

This approach more closely follows the modal approach of the other monographs on international TCD themes (Marine in 1988 [2nd ed], Railroad in 1992, Aero in 1994). Systems played a smaller role with other T-M forms than with TCD. Lighthouses, for example, are a markedly independent aid with little employment of systems. While other marine T-M forms gradually became parts of systems, nonetheless, an individual character was retained. Systems were more a part of railway signals yet a domination of signals by trans-national conferences and resulting documents was less often present. Aero navigation has occupied an intermediate ground of independent aids and interrelated aids.

However, a near domination by systems has been clearly present with TCD forms. Even simple devices became parts of interrelated groups and, in time, systems regulating devices and interrelations took place. That systems focus was present with the first edition of Part E: signs, signals, surface markings were subsumed into of regional and global scope. This edition places more

emphasis on T-M phenomena and moves systems at least slightly off center field. The older edition retains importance for a more system-orientated approach.

This edition includes a reworked main classification as well as a variant classification new to Part E. Both the reworked main classification and variant classification are found in the General Classification (Part E, 1994 and 2003). Some further work on classifications was carried out for this edition. The original preface is retained though acknowledgements for the 1st ed are omitted.

PREFACE FOR FIRST EDITION

Volume II of *Transportation-Markings: A Study in Communication* continues the studies that were begun in the first volume. The earlier volume reviewed communication concepts -- especially those of semiotics and of the role of color in T-M -- and it presented a survey of surface, air, and marine markings in the US. That volume ended with a brief examination of one part of international Transportation-Markings -- that of marine aids to navigation.

Volume II will continue the international studies begun in the last part of the first volume. There are three intended parts to Volume II: Part E, Traffic Control Devices; Part F, Railroad Signals; Part G, Aeronautical Navigation Aids. Each of the three parts will be published as it is finished. While it is necessary to publish each of the parts separately, it is hoped that all three can be republished together at a later date.

The limited nature of this monograph cannot begin to encompass the complete field of traffic control devices; the

discipline is both vast and rapidly changing. Even a cursory resume of technical advances would require several massive tomes. Technical libraries, as a matter of policy, maintain only current materials and discard the growing collections of outdated materials. Therefore, it becomes necessary (and this is perhaps paradoxical) to narrow the scope of this study in order for it to be truly inter-national. The study is broad in the sense that it intends to examine officially sanctioned and agreed-upon traffic control devices wherever found; it is narrow in the sense that the study is restricted to the established forms of traffic control devices. Hence, the study may not be "up to the minute" or represent the "state of the art." It also avoids a primarily technological exposition of traffic control devices (TCDs). It focusses on TCDs as communications and specifically on the symbols and other devices that create and project messages to the motorist. In other words, the monograph has selected a "strata" in the complex of traffic control devices and follows that strata wherever it crops up; adjoining strata are left untouched.

This study is based on regional and global conferences on traffic control devices: signs, signals and pavement markings. It gives some attention to national systems when they are of major significance. This means, regrettably, that nuances and limited variations on the local level may not receive full attention. Of course the spreading influence of international agreements has had major impact on local and isolated situations and thereby reduces the variant forms of traffic control devices.

The agreements that are germane to this study include only current agreements but also those promulgated at various times in the twentieth century. This is necessary since no agreement, no system exists in isolation. The older

systems and understandings have influenced and shaped succeeding systems. No adequate understanding of the present systems of TCDs can be gained without examining earlier systems. Further, nations and regions have utilized other systems and produced "hybrid" systems of TCDs. Only an examination of competing and obsolete systems will sufficiently illustrate how the hybrids and local practices came into existence.

This study can not be considered a compendium of TCDs. Hopefully it will provide an introduction to them as a means of human communications.

A NOTE ON NOTES

Volume II does not include the traditional form of notes whether these be footnotes or endnotes. Volume II has instead adopted the "author-date" system as presented in the 13th edition of the University of Chicago Press *Chicago Manual of Style*. While older editions of the *Manual* included the "author-date" system it was not until the 1982 edition that the University of Chicago Press gave the premier position in their coverage of source identification systems to the "author-date" approach. The value of choosing unnumbered over other forms of notes is under- girded by the economics of author-date: simplicity reduces costs to author, editor and printer. The 15th edition of the *Manual* of 2003 continues the "author-date system."

The notes in this monograph will include the author, date of publication of the source and page number. In many instances the reader can quickly locate the full entry in the Bibliography with only the name of the author. But since many of the sources come from international organizations, and since publications of that parentage often come

equipped with complex and convoluted titles, it has proven necessary to preface the Bibliography with a list of the abbreviated authors and the corresponding full title.

A limited number of substantive notes are, nonetheless, required for this study. These notes will be found at the conclusion of the chapters. The reader will be alerted to the presence of these notes by a brief entry in the text.

The acronym "TISRP" found in many of the notes stands for "This Is the Source for the Remainder of the Paragraph." The use of the acronym reduces unnecessary repetition of source references while providing necessary documentation.

CHAPTER ONE

THE DEVELOPMENT OF

TRAFFIC CONTROL DEVICES: 1909-1950

1A European Traffic Signs

1A1 Introduction

This chapter focusses on Traffic Control Devices up to 1950. The greater part of the chapter focusses on Traffic Signs. The focus on signs is dictated by greater complexity with signs than other safety aids and by less attention to Traffic Markings and Traffic Signals in earlier systems. While T-M phenomena is given increased attention in this edition the role of systems remains significant. Those systems include systems of a global nature (at least by intent) as well as regional systems. There is, to be sure, no hard and fast line between the earliest official systems and signs and their organization of a precursor nature. For example, Krampen notes the vital role of early 20th century national systems for international efforts. Sign forms in the United Kingdom became a vital foundation of sign shapes in European-wide efforts and beyond. Sign symbols in Germany likewise became a core dimension of sign symbols over a broad area (Krampen 1983, 44-47). Krampen and Lay note the role of recycling clubs in 19th century and non-government organizations in laying foundations for national and international systems of signs (Krampen 1983, 39, 42; Lay 1992, 109). *T-M History* (Part J in this Series) offers a survey of these developments (pages 45-47). It is sufficient here to note the incorporation of pre-governmental efforts in international governmental systems.

The first edition of this work focussed very heavily on

the UN 1968 Convention. This 2nd edition also gives prominence to UN though other factors are given increased coverage especially in the Classification and in descriptions of types of traffic control devices. Various ideas from national and regional practices came together at UN 1968 yet those ideas retained an identity of their own and were not merely components which became entirely subsumed into the UN system.

The colors, shapes, and other symbols of traffic control devices in the second half of the 20th century as seen in UN 1968 -- and in systems apart from UN 1968 -- are a constant feature of urban and rural landscapes. Such devices have become such a ubiquitous feature that they may seem to have existed in profusion in their familiar form from ancient times, or at least since the last century or so. But that is not the case. Most of the ingredients of the Traffic control devices system originated in the earlier periods of the 20th century.

Krampen notes three major systems or movements before 1968: an European system, an American system and an African system; GERSS concur in this perception (Krampen 1983, 102). Usborne suggests four systems but his fourth system is that of GERSS which draws on the other three systems (Usborne 1967, 20). The European approach is multi-faceted. It includes 1909, 1926, and 1931 agreements. The incomplete 1938-1939 effort also needs to be included. Those endeavors which were under League of Nations auspices were essentially an European production. Even the 1949 UN Protocol, though ostensibly a global effort, was yet another version of the European system. The American system was essentially US in its earlier forms though the involvement of other nations in the Western Hemisphere moved the system toward greater usage of graphic symbols. Canadian practices offer an added

dimension to TCDs. The African system as filtered through Central and Southern African Conference in 1950 presented a third way involving European notions but also heavy employment of the English system which may be termed the Old British System. The 1952 UN effort is also a vital component that was global in scope and incorporated ideas from many sources.

UN Conference on Road Traffic refers to two conventions: one on road traffic, and one on road signs and signals (UN 1968, 4). Road signs and signals (and also pavement markings) is of primary interest in this study. The Road Traffic Convention is related to TCD forms but has no direct role here. That convention includes two primary themes: rules of the road, and the entrance of various forms of motor vehicles into international traffic.

1A2 European Traffic Signs: 1909-1926-1931

The nature of the 1909 road safety agreement, "Convention with Respect to the International Circulation of Motor Vehicles," was very European in orientation. At that period European nations substantially dominated the world in many respects and quite possibly viewed their concerns as synonymous with international concerns including matters relating to traffic needs. The majority of European nations were present at the 1909 Conference. Scandinavia, however, was not represented. Sweden, Norway, Denmark (which then included Iceland), were absent. Finland, a Grand Duchy of Russia was represented through Russia. According to the Conference papers only "mother countries" were included unless possessions were explicitly mentioned. Great Britain included its possessions under an imperial sounding title of "The British Dominions Beyond the Seas." (ICMV Protocol 1909).

The major topics of the meeting included standards for motor vehicles (these called for “a strong steering apparatus which will allow the car to be turned readily and with certainty,” and the “machinery must be so designed as to prevent ... danger of fire or explosion”), driver requirements, international trade passes, license plates, sounding mechanisms, provisions for motorcycles, and encountering and passing of other (ICMV 1909, Articles 1-7). A single article was devoted to traffic control devices: “Provisions of Notice-boards on the Highways” (ICMV 1909, Article 8).

“Notice-boards” have the meaning ascribed to warning signs of a later period. All 1909 signs covered by the agreement are concerned with dangers. The descriptions of the signs are brief and illustrations are provided in Annexe “D” of the Convention. Notice-boards are located outside of towns and cities, and, seemingly, are not intended for in-town usage; in fact, the document does not mention signs for towns and cities (ICMV 1909, Article 8). Placement of signs required that the signs are to be positioned ca. 25 meters (82’) from the point of concern (ICMV 1909, Art. 8).

The types of notice-boards included “unevent road (“cassis”), sharp turns (“virage”), level-crossing (“passage a niveau”; US parlance: railroad grade crossing), cross-roads (“croissement”) (ICMV 1909, Annexe “D”). 1926 signs display the same illustrations as those of 1909 though with variant names for some of the sign types (ICRMT 1926, 27; ICMV 1909, Annexe “D”). Seemingly, the meaning or intent of the sign remains constant though the terms that describe the graphic symbols are altered, perhaps to clarify the significance of the sign.

The 1926 “International Convention Relative to Motor Traffic” is a modification of the 1909 documents as can be seen by a comparison of the two documents. The 1926 document offers necessary alterations and expansion in the face of the growing motor vehicle phenomenon (see “aside” on following page. The makeup of the the conference participants reflects the aftermath of World War I. Germany was absent since it was not yet in the good graces of the European community (ICRMT 1926, 10-12). Again Scandinavia was noticeably absent with the exception of recently independent Finland. The Swiss government was also absent. Unlike the 1909 Conference there were non-European participants: Siam (Thailand), Egypt, Cuba, and Uruguay. This meeting, like that of the 1909 Conference, was held in Paris under the auspices of the French Republic (ICRMT 1926, 7-9, 28-30)

The 1909 Convention introduced, in a formal and international sense, the idea of traffic signs, but it did not take up color or shape of signs. The 1926 meeting added shape, at least in an elementary sense, to traffic signs (ICRMT 1926, 27). The nearly ubiquitous triangular sign can be traced to the 1926 agreement (ICRMT 1926, 27). Signals, for the present era, mean lighted and often flashing signs; but in 1926 the term meant traffic signs. The 1909 term “notice-boards” drop out and is replaced by “danger signals” (ICRMT 1926, 27; ICMV 1909, Article 8).

The participants were asked to “reserve exclusively the triangular form for these [danger] signs” to the fullest degree possible (ICRMT 1926, 27). The triangles were to be equilateral, and the sides were to be no less than 0.70m (30”). A hollow sign was permitted “when the atmospheric conditions were not favourable” for the standard solid signs. This variant of the sign does not have to include the appropriate message. These signs could be as little as

0.46m (18") on a side. Signs were to be at least 100m (328') from the obstacle in question, and a maximum of 250m (820'). (ICRMT 1926, 27).

Four of the six signs of 1926 (termed "danger signals") are identical with the 1909 versions, though as already noted, the English language version of the sign titles may be at variance with that of 1909. For example, gutter becomes "uneven road", sharp turn becomes "bend" (ICRMT 1926, 27; ICMV 1909, Annexe "D"). Level-crossings retain the same symbol but the French form adds "garde" to "Passage a' niveau" and the English form adds "with barrier" to "level-crossing (ICRMT 1926, 27). The changes were prompted by a new crossing sign for unguarded crossings and termed "level crossing unguarded"/ "passage a niveau non garde" (ICRMT 1926, 27). The final sign type is the hollow sign already referred to. (ICRMT 1926, 27). It is a standard triangle, and termed a "signal marque" in French and a "hollow sign" in English (ICRMT 1926, 27).

The 1931 agreement occupies a transitional position in the five European agreements and international agreements of the European system referring to road signs, signals, and pavement markings in the 20th century (LN ECRT 1931). This agreement goes beyond the concerns of the 1909 and 1926 agreements both of which focusses on danger signs. But it also parallels earlier agreements in that signals and pavement markings are both absent. It is the first conference under the auspices of a general international organization, in this the League of Nations*

*An aside: The 1926 Conference has an uncertain character about it. It involves the League of Nations but it also involves a French government sponsored meeting. Two strains of ideas and organizations somehow came

together. But the precise process is difficult to untangle. The 1926 Conference includes references to ratifying the documents through the French government. The League of Nations is seemingly not mentioned. See the 1926 Conference papers, *T-M History* (Part J in this Series), and other sources including Krampen.

The scope of the 1931 conference, seemingly, was confined to the European region, as can be seen in the title, "European Conference on Road Traffic." The Conference has the further distinction of including the least number of nations of any international conference on road traffic control devices: ten nations and the Free City of Danzig. The membership included France, Germany, Italy, Switzerland, Belgium, Yugoslavia, and Denmark (LN ECRT 1931, 4-6). Scandinavia (except for Denmark), Britain, Ireland, Austria, the Netherlands, the Baltic States, USSR and most of southern European were absent. Nonetheless, in excess of sixty per-cent of the European population -- excluding that of the USSR -- was represented at the Conference. Most of the participating nations were from western continental Europe.

The titles of the Conference document, "Convention Concerning the Unification of Road Signals" (CCURS) may create confusion since "signals" in the 1931 document means signs not traffic signals (The French version has "signalization routiere" (CCURS 1931). Lighted traffic signals are excluded in the 1931 deliberations. This is rather surprising since a number of traffic signals were in existence in that time. It is possible that the still experimental nature of signals, and uncertainty about colors contributed to the exclusion of signals. Traffic signals became commonplace in England and Germany only after mid-1920s (*T-M History*, 66). Road markings are also missing from that document. This may not be surprising

since markings were not well developed and commonplace at the that time.

Most 1931 danger-warning signs of the 1931 agreements were from the 1926 agreement. While most of the innovations in signs are in the area of what became known as regulatory and informative signs. Even though the Convention was attended by few nations it brought into prominence a variety of sign shapes and messages which continue to be used heavily. These include place and direction signs, prohibition, maximum speed signs, parking and waiting prohibition signs. (LN ECRT 1931, Annex 6-7; Tables I, II, III).

The second Appendix of the study provides details on the 1931 sanctioned signs. However, it does not provide details on color codes. Contrary to later agreements, colors are not always provided for certain classes of signs in LN ECRT 1931, and therefore it is not feasible to provide a full comparative examination of this topic. The 1931 agreement stipulated that when optional use colors are employed they must be used consistently throughout a given national territory (LN ECRT 1931, Annex 6). No colors are given for danger signs in the 1931 Convention. The "Signs Prohibition Passage" segment of "Signs Giving Definite Instructions" requires the predominance of red, which must be so employed "as to bring into relief the general contours of the sign" Other colors in such signs are optional; exceptions are to be found even in optional-use situations. (LN ECRT 1931, Annex 6).

Optional-use situations include the "road closed to all vehicles" signs, which has a white or "pale yellow" center within a red disc; the one-way road sign, which displays a white or "pale yellow" horizontal bar with a red disc (LN ECRT 1931, 6). Several other signs have the same motif

with the addition of figures giving prohibitions on certain types of vehicles or weight or speed limits. More at variance is the "waiting prohibited sign," which has a blue center within a "wide red border with a diagonal red stroke" (LN ECRT 1931, 6-7). The parking prohibited sign exhibits a red disc with white center (or pale yellow) with a large "P" beneath a diagonal red stroke (LN ECRT 1931, 6-7).

The "Direction to be followed sign" (within the "signs indicating an obligation" category) can be of optional colors "provided that red shall never predominate" (LN ECRT 1931, 7, TISRP). Custom house signs consist of a red disc with the conventional white or pale yellow center and "with a dark horizontal stroke." The word "customs" is inscribed on the disc in the national language. "Signs giving indications only" subscribe to the optional colors motif (providing that red does not dominate). Parking signs are to be rectangular with "blue for choice, bearing the letter P." Caution signs have a body of dark color and triangle in white or pale yellow. It was recommended that first-aid signs be rectangular in shape with a dark body "surrounded by a white stripe, and the centre of the plate bearing an appropriate emblem within a white square" No recommendations for color are given for place and direction signs.

1A3 The "Old British System" (OBS), 1903-1950

What is sometimes referred to as the "Old British System" of road signs stemmed primarily from the work of a committee of the British Ministry of Transport known as the "1933 Committee" (UK HADTS, 1-2, TISRP). However, the foundations of British road signs can be traced back to parliamentary legislation in 1903. The OBS continued its development until its final alterations and extensions in 1957.

The double-sign concept which was an integral part of British signage (including that of British colonial and some commonwealth political units) also dates back to 1903 and 1904. There are some indications of cross-fertilization between the older signs. Nonetheless, the approaches to signage were at variance.

The warning signs outlined in the Motor Car Act of 1903, and presented in a circular of 1904, included these signs: hazardous corners, cross-roads, and steep grades signs. Warning signs were to be marked by a "hollow red triangle," and attached to this would be a plate with the appropriate representation of the hazard. Prohibitory signs were marked by a "solid red disc." (UK HADTS, 1-2).

A circular on signs in 1921 includes the previously mentioned signs (in 1904 circular) and adds a provision that route numbers for roads were to be added to the arms of direction posts. The red triangle of 1904 is termed a "danger sign" in 1921, and the two-part sign concept is strengthened by the addition of a symbol and word inscription to the rectangular plate below the triangle. (UK HADTS, 1-2).

In 1931 the Ministry of Transport established a committee with the assigned task of studying the current British sign system and of offering ideas on change. New sign formats were added as a result of the study (UK HADTS, 1-2, TISRP). The "Report of the 1933 Committee" (which was the common title of the Report) provided the foundations of the British sign system until the establishment of the Protocol system between the years of 1964 and 1967 in Britain. A later committee, in 1944, proposed additional changes; however, the committee's views were not issued until 1950. Finally, limited alterations in 1957 added pictorial signs. The OBS in this

study refers to the 1957 version. The 1933 phase, as previously noted, held a predominant significance throughout the life of the OBS. It can be noted that the OBS was essentially completed by 1950.

The System's signs are divided into two categories: "Prohibitory and Mandatory" and "Warning and Informative" (UK MT, TISRP) and source for paragraph). A chart of OBS verbally describes prohibitory signs as "YOU MUST NOT," and mandatory signs as MUST BE OBEYED." These signs, as is the case with most OBS signs, are two-part signs. The upper part of the sign is comprised of a circle. Red is a common color for these signs. In some instances red entirely colors the sign while in other instances red serves as a border color or some other function. In most instances, the lower plate of these signs is rectangular in shape. In some cases the long dimension is vertical while in other situations it is horizontal. All of the lower signs have a black rim, white ground, and black legend.

The second category, that of "Warning and Informative" signs, consists of a triangle accompanied by a rectangular plate with the long dimension vertical (UK MT, TISRP). The triangles uniformly exhibit a red border with a white ground. The rectangular signs display a black rim, black symbol, and white ground. There were several exceptions to this practice. In one case a sign displayed a rectangular shape with the horizontal as the longer dimension, and in another the sign was of circular shape.

1B Final League of Nations/Initial United Nations
TCD Work

1B1 Introduction and League of Nations, 1938-1939

The final League of Nations effort at traffic control devices preceded World War II and, in fact, was interrupted and rendered incomplete by that conflict. Not many years after the end of the war an initial United Nations effort was undertaken (UN Conference on Road Traffic, 1949). Both had global intents though both proved to be less than global in actuality: both were slanted toward the European experience. This subchapter reviews those two endeavors that bracket World War II

A review of sign codes with an European cast would appear to follow this chronology: Paris 1909, Paris 1926 (With ties to LN though not fully a LN project), LN Geneva 1931, UN Geneva 1949. But an examination of the 1949 and 1931 codes suggests a very great leap in the numbers and types of signs from 1931 to 1949. One might deduce, or at least speculate, there was an intervening "missing link." This speculation would prove to be true since there is a "missing link," or at least an obscured link between 1931 and 1949. This link, in a sense, is hidden since it never reached a definitive state and never was published. The documents are to some degree not readily available because of confidentiality generated by their unfinished state.

This link is the product of the Committee of Experts on the Codification of Law (hereafter, CERCL), a component of the Communications and Transport Group of the League of Nations. CERCL with the aids of other groups (especially the Committee on Road Traffic) met periodically

over much of 1938 and 1939. The fruits of their efforts was the document "Draft Regulations." While not a definitive product it was, nonetheless, approaching a completed state. What might have been the final meeting was scheduled for September of 1939, but that month marked the beginning of the cataclysm of World War II (LN DCT--CERCL RTS 1939, 10). The movement toward agreement on the thorny issue of traffic signs was not mirrored by a movement toward peace. The unfinished work of CERCL would not be taken up again until 1949.

It needs be emphasized that in a discussion of the League of Nations "Committee of Experts for the Codification of Road Law" the documents did not reach a definitive state, even though the mention of minutes and regulations in this study might suggest a complete state. Neither should the degree of completion of CERCL be confused with the degree of completion of GERSS. The GERSS "Draft Convention" by contrast was complete and was ready for either signature or for conference level deliberations.

Principal documents of CERCL include the Reports of the Committee: 1st Session (two reports), 2nd Session, and 3rd Session; and the "Draft Regulations." The illustrations of the proposed new signs were separately printed (LN DCT-CERCL RFS 1938 (2); RSS 1938; RTS 1939; Tbl. III.). The 1st Session did not consider road signs while the 2nd Session (November 21-30, 1938) examined road signs in detail. The first topic of that session dealt with the coloring of sign posts (LN DCT-CERCL 1938, RTS, 15,). It becomes evident in the discussion of signposts that CERCL did not have exclusive rights over the matter of road signs. An additional committee, the "Special Committee on Signs at Railway Crossings," had separately

established the requirements for signposts at level-crossings. These were to be “painted in alternate stripes of red and white, or red and light yellow ...” CERCL shelved the question of painting sign posts since some signs do not have posts, and further, the painting of sign posts “can well be left to the competent authorities in each country.” The reference to level-crossings is not included in the “Draft Regulations,” though it is to be found in the 1949 Protocol (see UN 1949 Protocol, 84-85).

Treatment of danger signs in 1938 began with an examination of signs at level-crossings (LN-DCT-CERCL, RSS 1938, 15-16). The 1931 agreement spoke of “guarded” and “unguarded” crossings; CERCL removed the ambiguity by changing the titles to “level crossings with gates” and “level crossings without gates.” It was further agreed that sign No. 7 can be either a vertical bar, almost of a lozenge shape, or an “!” point. The 1931 Convention added a sign of triangular shape with a point downwards that has the meaning of motorists must yield to motor vehicles travelling on road which is being approached. It was noted in CERCL discussions that the sign had considerable value in the nations which employed it, and it was retained by CERCL. The much later US “Yield” sign is a derivative of this sign (Kell 1958, 2-4).

The CERCL discussion on right of ways and priority roads would prove to have implications for safety conferences for many years (LN DCT-CERCL 1938, RSS, 16-18). The complexity of the problem and the uncertainty surrounding it caused the Committee to call for a collection of right of way practices of various nations; some of the Committee documents are comprised of these practices. The matter of sign colors was also broached by CERCL. It was noted that no sign colors were officially in use. The

1931 code had remarked that danger signs should employ a “dark colour on a light ground or a light color on a dark ground” but made no specific recommendations. That same convention also stated that the hollow triangle sign could be “painted in any colour,” and the point-downward triangle could have a dark border and light center, or a single color without. This situation prompted CERCL to also request information on color codes for signs. The second session ended with observations that a further sessions was needed and that the participation of the US was to be encouraged. (LN DCT-CERCL 1938, RSS, 16-18).

The 3rd Session is markedly important since that session issued a report of CERCL’s deliberations including a full-scale draft of road signs, and a table of illustrations (LN DCT-CERCL, RTS 1939, DR 1939, Tbl III., 1939). The format of these documents is based on the arrangement of signs established in 1931. CERCL endorsed the differentiation already in use in Europe of triangular-shaped signs for danger, circular-shaped signs for both prohibitory and mandatory signs, and rectangular-shaped signs for “caution or special indications” (LN DCT-CERCL 1939, RTS, 3).

Danger signs continue the point-upwards triangular shape (LN DCT-CERCL 1939, RTS, 3-5). However, the 1931 signs in CERCL were of simple and stark form including turn symbols that were sharp, and very unequivocal cross-road signs. In 1938-1939 a need was seen for variant forms of the earlier signs. For example, single bend and double bend signs as well as sharp bend signs were required for traffic safety. Level crossing signs were to follow the pattern set down in the “Draft Regulations” for that function. This session also approved

“School entrances” signs with necessary variant forms. Later sign codes would include a similar sign under the title of “Children” rather than “School Entrances.” The draft document permitted two forms of the “Other Dangers” sign: The established vertical bar signs and the “!” form. The addition of a supplemental plate was permitted for the “Other Dangers” sign which would explain the nature of the danger. (LN DCT-CERCL 1939, RTS, 3-5).

UN 1949 Protocol, however, provides for an “Other Dangers” sign that contains a vertical bar or symbol for danger; a supplemental plate is also allowed (UN Protocol, 89). The hollow sign continued in the 1938-1939 documents with the provision for a supplemental plate which explains the specific danger. The “Priority of Passage” sign of 1931 is also retained (LN DCT-CERCL 1939, RTS, 5). The instructions for the meaning of this sign were written so as to avoid irritating nations not accepting the “passage of priority” concept. The United Kingdom, for example, did not accept the idea of priority at that time, but did accept the idea of reducing speed or stopping at the juncture with a more important road. The request for data on sign colors at the second session was completed. It was found that the “number of colour systems was not large.” (LN DCT-CERCL 1939, RTS, 5).

Prohibitory and Mandatory Signs (with “or” rather than “and” in the Draft document) were termed “Signs Giving Definite Instructions” in 1931 and again in 1949, but there was no encompassing title for 1938-1939 (LN DCT-CERCL 1939, RTS, 5). The color of red was given a major role in prohibitory signs. It is to dominate the sign, as well as serve for the border color. Seven of the eight 1931 signs were retained by CERCL, though the speed limit sign requirements permitted the national unit of measurement in

place of the 1931 rule requiring the national unit of measurement had to be in kilometers. The remaining sign, sign 7, is dropped since that sign was seen to be a duplication of sign 6. Sign 6 was a weight limit sign, while sign 7 was identical except for the addition of an illustration of a vehicle (LN 1931 CCURS, Table II; in addition to previous source). CERCL introduced one new sign: a bicycle prohibition sign (LN DCT CERCL 1939, RTS, 5: Tbl III).

Parking signs proved to be a problem for CERCL; this would also continue to be a difficulty for later sign code attempts. (LN DCT-CERCL 1939, RTS, 5-6). The 1931 Convention included one sign for waiting and a second for parking. But CERCL noted a basic problem was the uncertainty over the meaning of “stopping,” “waiting,” and “parking.” CERCL decided that stopping was of “brief duration”; “waiting” could be of “any length”; and “stopping” referred to dropping off or picking up passengers or freight. The act of parking was a formal placement of a motor vehicle in a parking slot for a period of time. CERCL, based upon its study of terms, added a stopping sign to the list of approved signs. This new sign had one oblique bar. CERCL eliminated the 1931 “No Parking” sign, since it was thought “that all that is needed in the case of parking is to have a sign showing where parking is allowed.” A more realistic view might regard this reasoning as quaint, since it is evident that humankind will park vehicles in every conceivable -- and inconceivable -- space even if “No Parking” signs are arranged in serried ranks. The Committee also added a sign for indicating height or width restrictions. CERCL also included a prohibitory sign to address situations not considered in the signal code. The message of that sign was imprinted in the center of the sign disk. (LN DCT- CERCL

1939, RTS, 5-6).

The Committee also examined the issue of overtaking (passing) and whether there was a need for such an overtaking sign (LN DCT-CERCL 1939, RTS, 7-8). CERCL decided against that sign but, nonetheless, they “recommend [ed] a uniform model for such signs ...” for nations needing such a sign. The sign could represent “two motor vehicles side by side in the center of the disc ... one red and the other black ...,” or the figure with two arrows, proposed by the Committee on Road Traffic ...” CERCL preferred the arrow form. Both models are found in UN 1968. Also considered by CERCL was a possible sound restriction sign but this did not gain much support (LN DCT-CERCL 1939, RTS, 7-8).

Mandatory signs exhibit blue disks with the appropriate symbol in the center (LN DCT-CERCL 1939, RTS, 7-8). CERCL included three mandatory signs: a “Direction of Travel” sign, a “Bike Route” sign and a “De-prohibition sign”. The last name displays a disc in white or gray ground with black oblique band. The Committee on Road Traffic also discussed how to indicate the end of a prohibition since at the time there was no general use sign for that purpose. CERCL noted that the United Kingdom indicated the end of a speed-limit sign with a “white disc with an oblique band.” The band was to be black in color. (LN DCT-CERCL 1939, RTS, 7-8).

The Caution or Indication signs segment also lacked an overarching title (LN DCT-CERCL 1939, RTS, 8). The caution segment of this category is a relic of the time since no current signs are of the older caution form. These signs were proposed by CERCL. The Indication signs, however, provide components of more current informative signs. The

caution signs referred to schools and children. The second category, “Indication” signs, encompassed what are now the sub-categories of Indication, Advance Direction and Direction, and Place and Route Identification signs. (LN DCT- CERCL 1939, RTS, 8).

CERCL continued the 1931 signs for parking and for first-aid stations (LN DCT-CERCL 1939, RTS, 9). The Committee considered a possible supplemental parking sign for specific times and places of parking. This sign displayed a blue ground with white letters. The beginnings of “Advance Direction” signs can also be traced to CERCL’s inclusion of the existence of “Diagrammatic” signs. The diagrammatic signs portrays a diagram showing the lay-out of roads and places in advance. The Committee also considered priority road signs which had found use in several nations. CERCL decided against the inclusion of this sign. The sign would gain official recognition in the UN 1949 Protocol. (LN DCT-CERCL 1939, RTS, 9).

The problem of sign visibility also fell under the purview of CERCL (LN DCT-CERCL 1939, RTS, 9-10). The Committee noted that the “Draft Convention” included recommendations for reflectors for signs at level-crossings. CERCL did not issue a general and official recommendations for that function but they did recommend sign reflectors for halt signs and for signs denoting a road closed to all vehicles. A suggestion was made for a sign denoting tramway, trolley-bus, and motor-bus stops. That question was set aside until the projected September 1939 session of CERCL. (LN DCT-CERCL 1939, RTS, 9-10).

The Committee’s closing remarks noted the need for an additional session (LN DCT-CERCL 1939, RTS, 10). The projected session was needed for the completing the

“Draft Convention Concerning Motor Vehicles and Cycles” and settlement of the questions arising from Article 1 and 11-17 of the 1926 Convention relative to Motor Traffic.” The session was also needed for an examination of proposed articles to replace those of 1931 (the present committee had examined only the annex of the 1931 Convention, though that was of primary importance for traffic control devices), and for a reworking of the Convention Relative to Road Traffic of 1926.

The “Draft Regulations” of March 27, 1939 (CCT/CDR/5 (1)), Part III, “Road Signs” necessitates a brief review of the sign classification. (LN DCT-CERCL 1939, DR, 3). The “Draft Regulations” begins with a classification of signs including necessary data on shapes of signs and the appropriate circles, squares, rectangles, and triangles imprinted on the signs. Each of the three groups (Danger, Prohibitory and Mandatory, Caution/ Indication signs) is considered separately. (LN DCT-CERCL 1939, DR, 3).

Danger signs are divided into triangles with point up, and those with point-down (LN DCT-CERCL 1939, DR, 9-13). There are six signs for specific dangers, and two of these have variant forms. There is a general-type danger sign, which also has two forms. A complex color code is provided for these signs. The 1938-1939 efforts failed to assign an over-riding term for two of the categories. The second category is comprised of two units each of which forms half of the title: Prohibitory or Mandatory. The third category encompasses “III A (Caution signs)” and “B” (presumably III B) Indications signs. Text materials of the “Draft Regulations” are satisfactorily addressed in the discussion of the Third Session.

Considerable attention is given to the Protocol throughout this monograph. However, it is also necessary to consider the 1949 UN in itself. The Protocol has importance since it provides both an extension and expansion of earlier attempts at international traffic signs systems; it underlies many current systems since it represents one of the two primary “currents” (with a third strain to some degree) in global sign language; and, hence, it will not soon lose its importance.

The 1949 UN Protocol might have provided the basis for a truly international system of signs, but that did not happen. Instead, the 1949 Conference on Road Traffic led to a concretizing of divergent approaches in signs that already existed. This is especially true for danger warning signs. In 1949 most of the developed road systems were either in Europe or in North America. European states constituted a substantial portion of all independent nations at that time; and, not surprisingly, the European position generated a reinforcement of a system acceptable to European, but less so to many other nations. The Protocol was in the vein of 1909-1926- 1931-[1938-1939] agreements; those earlier agreements were very much European in foundation and outlook. The Protocol, however, failed to gain sufficient signatures to achieve ratification; however, heavy usage of its provisions was to occur. (UN 1952 GERSS, 7).

The end result of the 1949 Conference was a bifurcated statement: a vague and general outline of good intentions (in the Conference document) sufficiently bland and vague to be agreeable to all, and a very specific European-based Protocol acceptable to only a portion of the

participants (UN 1952 GERSS, 2-3). The 1949 Conference authorized a further study by experts in order to achieve the yet elusive goal of a more global system of signs. The study, that of GERSS, was held though no global system was to be forthcoming. (UN 1952 GERSS, 2-3).

The 1949 Conference divided signs into recognizable categories which continue to undergird current sign practices: "Signs giving definite instructions," danger warning signs, and informative signs (UN 1949 Protocol, 79-80). Regulatory signs is an alternative for the first named category. That first group is again divided into three smaller groups: indication, "advance direction signs and direction signs," and "place and route identification signs" (UN 1949 Protocol, 80). Each category of sign displayed a specific shape though the categories lacked a distinctive color. This is in contrast to the American system which was both. (UN 1949 Protocol, 80; US 1971 MUTCD, 14-15). This was to be a point of controversy since the dual method of sign differentiation was lacking in UN 1949 (Shoaf 1968, 1). All warning signs and the prohibitory segment of "signs giving definite instructions" (a term continued by GERSS and UN) share the same border, ground, and symbol colors (UN 1949 Protocol, 82, 91). The 1952 Draft Convention eliminated that practice, but the 1968 Convention reinstated it for those nations opting for Protocol-style signs (UN 1952, GERSS, 39, 54; Shoaf 1971, 61).

Norms for danger signs included sign sizes (standard, 38"/.70m per side minimum; reduced size, 25"/.60m per side) as well as placement of signs, and standards for the heights of signs (UN Protocol, 82, 89-90). A list of sign types is given in the first Appendix of this study. The distinctive shape for danger signs is that of the triangle with

a single upturned point. In most instances the symbol is inscribed on the sign without employing supplementary plates. Though the Other Dangers sign did make use of such plates. An appropriate symbol can be embossed on the plate; the rectangular sign is then affixed beneath the triangular-shaped sign. This double-sign approach was the foundation of the CASATC system and probably finds its source in British practice. The added plate is also found with the signs known as "hollow red triangle" signs, which are employed "where atmospheric conditions do not permit the use of the full sign." A variant of the standard point-upwards triangular is the "Priority road" sign, which has the single point in the reverse position. A plate can be added indicating the distance to the road in question. (UN Protocol, 82, 89-90).

"Signs giving definite instructions" are those emitting messages of a prohibitive or an obligatory nature (UN 1949 Protocol, 90-91). Most of these signs conform to standard or reduced sizes, though in some instances a smaller model can be installed. Protocol included locational and height requirements as well. The prohibitive part of these signs exhibit a red border and ground white or light yellow in color that encompasses a symbol that is black or at least in a dark color. Exceptions to this pattern include the "no entry for all vehicles" sign (an all red sign with a white, or light color, and a horizontal bar), and the "turning prohibited" signs (which contain a diagonal red bar for the prohibited turn). The "Stop" sign consists of a red triangle with red border and "Stop" inscribed in the national language; this last feature is optional (UN 1949 Protocol, 96-97). The restricted stopping or waiting sign consists of a red border, blue center, and red diagonal bar. An accompanying plate can detail the specific meaning of a given sign of that type. An alternative version indicates

when waiting and stopping prohibitions refer to one side of traffic only. (UN 1949 Protocol, 96-97).

Mandatory signs exhibit a blue ground and a white symbol. The various signs follow this format closely and as a result there is little variation nor a need for expanded comments (UN 1949 Protocol, 92).

The first category of informative signs are those termed "indication signs" (UN 1949 Protocol, 100-101). Protocol states that these signs are to be of rectangular shape (though some are of a square shape). The color red is not to dominate in this group. This category begins with parking signs. These signs are square and of two standard sizes. The sign is blue with a white graphic or word symbol in the national language. The hospital sign can be described in nearly identical terms.

Other signs include the auxiliary signs, which are rectangular in shape (with the vertical as the longer dimension) and the symbol inscribed in black or blue on a white center within a blue border (UN 1949 Protocol, 101-104). "Priority Road" signs and "End of Priority" signs are diamond-shaped signs (or in Protocol parlance, "square with one point downwards"). The signs have a black rim, white border and yellow center; the second sign adds a transverse bar in black. A plate can be added to this same sign to indicate the "approach to the end of a priority road." Advance direction and direction signs are rectangular in shape and "have either a light ground with dark lettering or a dark ground with light lettering." (UN 1949 Protocol, 101-104).

Concluding signs of this category include direction signs which are "rectangular with the longer side horizontal

and ... terminate in the form of an arrow-head" (UN 1949 Protocol, 104- 109). "Place and route identification signs" complete the category of information signs which are similar in shape and color format to previously described forms. "Special identification of route" signs, however, are much smaller and may either exist independently, or they may be affixed to mileposts or other signs. Route markers probably qualifies as an alternate term. "Supplementary provisions" for level-crossings are also detailed in the Protocol. (UN 1949 Protocol, 104-109).

The first coverage of traffic signals in an European-influenced document is found in Protocol (UN 1949 Protocol, 107-109). The documents provide for a three-color system of red, green, and amber, and a two-color system of red, green, and amber, and a two-color system of red and green. In the second case a combination red and green signal can serve the purpose normally fulfilled by an amber signal. Flashing amber is permitted in the Protocol, but no mention of flashing red is to be found except for level (railway) crossings. (UN 1949 Protocol, 107-109).

The first mention of pavement markings in an European-based safety publications is also found in Protocol (UN 1949 Protocol, 111-112) though the provisions are not extensive. This is understandable since the publication was the pioneer work for such regulations. Lane markings (presumably center-lines) are applied where necessary. Protocol included guidelines on their use. Edge reflectors are included for necessary situations. Reflectors are to be red in color or orange for the "direction of traffic" while white is employed for the opposite side. White or amber reflectors mark various kinds of obstructions in the actual roadway.

1C Traffic Signs Developments in Africa/Middle East/
Asia/Pacific/Americas: 1925-1950

1C1 Early Africa/Middle East/Asia/Pacific/Americas

a) The Americas

This segment takes up a vast area encompassing much of the globe. Work undertaken on traffic control devices was of limited scope. And in Africa, Asia, and the Pacific TCD developments were heavily influenced by factors outside the regions. Only in the Americas did substantial independent work take place; and most of that in the US. Only in Africa did an international conference take place and that at the tag end of this quarter-century. That conference requires a separate section because of its complexity.

Traffic control devices development in the Americas has undergone several phases: 1) The development of traffic signs in the US. This development has had worldwide significance especially in light of the octagonal stop sign and of the diamond-shaped warning sign. 2) The role of the various editions of the *Manual on Uniform Traffic Control Devices* (MUTCD) beginning in 1935. 3) The meetings and resolutions of the Pan American Highway Congresses, and of the American Travel Congress. Central American sign development, the *Inter-American Manual of Traffic Control Devices*, and the polyglot Canadian system and the impact of the "American System" on UN 1952 GERSS formulations are extensions of these developments that spill over into the modern era.

Much of the work underlying the US sign system, including sign concepts that had international influence beyond the US, can be traced to the early 1920s. It is

possible -- without overly simplifying events -- to locate the cause of many traffic control devices foundations to a few specific individuals and the maintenance/public works departments in a few US states. The first significant classification of signs is that of the Mississippi Valley Association of State Highway Departments (MVASHD) in their 1923 meeting (Sessions 1970, 84). Officials of three midwestern states had created the basis of that first classification by their proposals of a system of sign shapes, colors, and messages to the MVASHD (Sessions 1970, 82).

This system proposed round signs for railway crossings, octagonal signs for stop, diamond-shaped signs ("square with diagonal vertical") for "slow warnings," rectangular for "directional regulatory information," and route markers of a design at variance with previous notions. (Sessions 1970, 84).

The ground (background) of these signs was to be white, and the letters and graphic symbols were to be black (Sessions 1970, 84). The recommendations were then passed onto the American Association of Highway Officials (AASHO). The State of Minnesota enacted the first *Manual of Markers and Signs* in 1923 (Sessions 1970, 84). This document determined the use of black symbols, or letters, black rims, and a ground of lemon yellow. The recommendations were presented by AASHO to the US Secretary of Agriculture (October 30, 1925) and approved on November 18 of that year (Sessions 1970, 92). AASHO approved the report on the same day at their annual meeting at Detroit. Before the first day of February in 1926, forty-one states had approved the report. AASHO published the *Manual and Specifications for the Manufacture, Display, and Erection of U.S. Standard Road Markers and Signs* in January of 1927 (Sessions 1970, 92).

The Manual contained these principal provisions: 1) diamond-shaped signs projected a message “requiring slow speed and caution... ” 2) Square-shaped signs indicated that caution was required because of “contiguous or adjacent conditions which are also intermittent ... ” 3) All signs that give a message of a “precautionary nature” have a yellow ground and black symbols. (Sessions 1970, 92).

This system described signage for rural areas but it did not address urban needs as such. The first manual for urban requirements was promulgated in 1930 by the American Engineering Council for the National Conference on Streets and Highway Safety, and entitled, *Manual on Street Traffic Signs, Signals, and Markings* (Sessions, 1970, 118). Its basic principles and norms were very much akin to those of the AASHO publication. The need for a single volume on signs, markings, and signals was very early realized, and NCSHS and ASSHO formed a Joint Committee in 1931. The first of many editions of the *Manual on Uniform Traffic Control Devices* was published in November of 1935. This first amalgamated edition reflected the now long established norms on shapes, colors, and graphic and word symbols. The *Manual* and its successors were to have great significance and its value would steadily increase. The 1948 edition (2nd ed) offer a variety of changes including great usage of graphic symbols (though on a limited scale in comparison with present-day usage) and increased employment of pavement markings and advances in traffic signals (US MUTCD, 1-2).

Uniformity in signs was a concern elsewhere in the Western Hemisphere for more than 40 years. The desired uniformity did not materialize until 1967 (PAHC 1967, IAMM). Early concern was expressed through a study of

the issues and a focuss on recommendations. The problem first received attention at the inaugural meeting of the Pan-American Road Congress in 1925 (Sessions 1970, 129-130). A resolution was passed calling for a study and adoption of a uniform system of signs and signals. The 2nd Pan- American Road Congress in 1929 noted that the “European system” failed to meet American needs and that a study of signs was needed. They further noted the need for “a project for a uniform international code” and “that such signs be prepared for adoption by the member nations of the Pan American Union ... ” At the Pan-American Congress in 1930 a “Convention on the Regulation of Automotive Traffic” was approved. Article XI of this document called for “danger, restriction and direction signs (to) be made uniform as between the several states.” (Sessions 1970, 129-130).

The 3rd American Travel Congress (San Carlos de Bariloche, Argentina) in 1949 proposed a unified American signs system with the US MUTCD as the foundation of it (Sessions 1970, 130). Progress toward a much desired uniform system was slow, but it can be noted that a great system of highways and a large number of motor vehicles were absent in considerable parts of the region until relatively recent times.

b) Africa/Middle East/Asia/Pacific

Development of traffic control devices in the vast area stretching from the Cape of Good Hope to the Suez Canal and on to the Pacific was much more limited than that of Europe and North America before the deliberations and document of UN GERSS 1952. And much of that limited development was largely dictated by organizations and nations outside of Africa, Asian, and the Pacific

regions. Nonetheless, some degree of activity was present.

For the most part, Africa followed the "European system" after the 1926 agreement in Paris (UN 1952 GERSS, 12). But the 1931 Convention results held sway only in North Africa; variants of that agreement came into use in sub-Saharan Africa. Efforts at unification of signs were attempted in Africa, and a system of signs was proposed for Southern Africa before World War II, but that conflict precluded very much use of new ideas in traffic signs. In 1950 the Johannesburg conference was held which greatly altered sign patterns in sub-Saharan Africa (UN GERSS 1952, 12).

Asia and the Pacific present a very mixed pattern during this period. Some nations (Iran and Thailand) closely followed the 1931 system (UN 1952 GERSS, 13-14). While other nations employed the hollow triangle in red above a rectangular plate displaying appropriate symbol bearing the symbols of the Old British System (OBS). These nations of India (Pakistan, Bangladesh, and Sri Lanka), Malaya, Australia, and New Zealand. These latter nations were either possessions, or independent nations, affiliated with Britain. And all, to some extent, followed OBS noted for its two-part sign system. (UN 1952 GERSS, 13-14).

The Middle East nations also employed the European system though road signs were limited in much of that region; at least at the time of the GERSS survey of traffic signs. Egypt and some other nations added supplement plates with word inscriptions to signs with graphic symbols (see previous remarks on OBS and on Asia and the Pacific; UN 1952 GERSS, 15). Turkey adopted the American system would later and allegedly take up the new approach

of GERSS.

Japan is an especially important nation in transportation and communications since the latter nineteenth century. Japan provides an example of a more advanced and developed level of traffic control development in contrast to what is found much of the Asian continent in the first half of the century. Japan, in its development of traffic control devices is more akin to European and North American nations. Japan's approach to traffic signals and signs mirrors its approach to industrial development: a selective and judicious borrowing of ideas and practices with a subsequent altering through the crucible of Japanese experience, culture, and of course, indigenous development. (PICHSS 1972, 28).

Japan first established a substantial system of traffic signs in 1922 (PICHSS 1972, 28). The Japanese sign ordinance of that time made considerable usage of what has been termed the OBS. Most of the signs were either warning, or guide signs (direction and destination); they included the dual-sign approach of graphic symbol and word message (in Japanese). While the OBS was widely employed in the United Kingdom (and its possessions and affiliations), Japan offers a first usage of OBS outside the British orbit. The Japanese sign system, as is common in sign systems in the first quarter or first third of the century, was largely restricted to warning signs and some guidance signs (PICHSS 1972, 28).

In 1942 Japan promulgated a new ordinance for signs (PICHSS 1972, 28). This was an expanded system that added "prohibitory, regulatory and instruction signs" to those already existing. During this process of revision the German sign mode became prominent in Japanese thought.

It is also obvious that Germany's system was influenced by various European efforts at sign techniques and applications. This can be seen in the choice of color meanings and basic symbols adapted by Japan which resembled those of Protocol 1949. These also were based on European ideas (PICHSS 1972, 28-29).

Japan's alertness to transportation needs and to new thinking in signs is evident in the revision of the ordinance in 1950. This revision was substantial and in accordance with UN 1949 Protocol (PICHSS 1972, 28-29). However, not all of the UN provisions were adopted. US influence was also to be seen in the revision. Japan adopted a five-part division of signs: guide, warning, and prohibitory, instruction and indication (the last three constituting what is normally seen as regulatory signs). Regulatory signs followed UN symbols in most instances. Graphic symbols were combined with word messages (both English and Japanese). The American system served as a pattern for warning signs. Guide signs were "of an original style." However, various guide signs were more complex and generally poorer than those of 1942 revision. The 1950 alterations focussed on the maximum use of graphic symbols and word messages with both English and Japanese words (as an interim measure), American system style warning signs, and usage of color (red for prohibitory, green for instruction and indications signs). (PICHSS 1972, 28-29).

1C2 More Recent Africa: CASATC

Among the more curious international agreement on traffic control devices is that of the Central and Southern Africa Transport Conference held at Johannesburg in 1950. The Conference encompassed all of southern Africa, much

of Central Africa, and some north-central areas (CASATC 1950, 30). Portions of what are not infrequently termed East Africa and West Africa (though not the Guinea Coast or West-Central Africa were subsumed under the term "Central Africa." (CASATC 1950, 30).

The Conference is curious for several reasons: only one of the governmental units participating in the Conference was an African-based independent nation-- that of the Union of South Africa. And that government was based on a political franchise that excluded over 80% of the population (*Statesmens' Yearbook* 1952, 247). The participants included representative of the governments of Belgium, France, Portugal, Southern Rhodesia, the Union of South Africa, and the United Kingdom. Southern Rhodesia was not independent but it did possess a legislative assembly.

The territories represented were Angola, Belgium Congo (Zaire), Ruandi Urundi (Burundi, Rwanda), French Equatorial Africa (Gabon, Congo, Central African Republic, Chad), Northern Rhodesia (Zambia), Nyasaland Protectorate (Malawi), East African High Commission (Kenya, Uganda, Tanganyika [later Tanzania with addition of Zanzibar]), High Commission for Basutoland (Lesotho, Swasiland), Bechuanaland Protectorate (Botswana) (CASATC 1950, 30). The Cameroons (French and British), and Spanish Guinea (Equatorial Guinea) though adjoining the region of the conference were not members. The US and the International Bank for Reconstruction and Development joined the Conference as observers. (CASATC 1950, 30).

The resulting system of road signs, signals, and markings is also curious. The CASATC system of signs

Prohibitory and mandatory signs form a single group. This is contrary to the 1949 Protocol. This means that the predominantly red sign for prohibitory and predominantly blue sign for mandatory as distinguishing marks are absent from CASATC. Many of these signs are also of a composite nature for CASATC. They display a red-bordered circle combined with a yellow ground. The round portion displays a white center without other symbols. The plates are generally rectangular in shape with the longer dimension horizontal, and the symbols are black. The stop sign has one of three possible designs: a) The first is a rectangular plate with a markedly elongated vertical appearance and with a surmounting top circle of small size and in red; the word STOP is inscribed on the rectangular plate. b) The second consists of the standard red-bordered circle with a rectangular yellow plate with the longer dimension horizontal; again, the word STOP is inscribed on the sign. c) The third version is found at level crossings. It is composed of a red circle and a large plate in yellow with the word STOP. This sign plate is distinctive in that the corners of the plate are "cropped off" creating an eight-sided sign though four of the "sides are diminutive.

"Parking" and "No Stopping" signs have the respective messages inscribed on the signs (CASATC 1950, Appendix III, Schedule 2). The 1949 Protocol of the UN lacks a "Prohibition of Parking" sign. However, prohibition of parking in the Protocol was covered by the "Waiting Prohibited" sign (UN 1949 Protocol, 99). By contrast, the 1931 agreement did have such a parking prohibited sign (LN 1931 CCURS, 7). The CASATC signs have a red rim, yellow ground, and a red transverse bar. This category of sign includes the general "No Parking" sign, which consists of a transverse bar, and the letter "P"; and the selective "No Parking" sign, which adds the hours



incorporated the Protocol sign shapes and symbols, but in conjunction with the OBS style of danger warning signs (CASATC 1950, Appendix III; UK MT broadside). This meant that each sign unit contained a Protocol triangular-shaped sign (red border, white ground) accompanied by the OBS danger warning colors of yellow and black, though on a rectangular-shaped sign (CASATC 1950, Appendix III, Schedule 1, and 83). The foundations of the two-part sign concepts are not given in the documentation of CASATC, though it appears they stem from the OBS sign format approach (CASATC 1950, Appendix III; UK MT broadside). In short, CASATC constructed a unique arrangement out of familiar components.

This system has proven to be more than a local curiosity since it attracted the attention of nearly-simultaneous deliberations of the "Group of Experts on Road Signs and Signals" (GERSS; and, in fact, it constitutes a third approach to signs in the 1952 UN Draft Convention documents (UN 1952 GERSS, 17). GERSS speaks of two strains of TCDs though they include a third version. Krampen goes further and speaks of three strains; the third being that of CASATC which he denotes as the African (Krampen 1983, 102).

CASATC danger signs display a triangle with a broad red border with a white triangular center or ground (CASATC 1950, Appendix III, Schedule 1). No symbols are inscribed in the triangle. The plate below the triangle is yellow with black graphic symbols. The plates are the same height in all cases, though the width may vary in some instances. Some plates are of a square shape while others are rectangular in shape; the horizontal dimension is the shorter dimension. (CASATC 1950, App. III, Sch. 1).

of no parking and also a red transverse bar. The “One-way” and “Cycle Track” sign are akin to the UN mode except for a red ground in place of the blue ground (UN 1949 Protocol, 98-100; also CASATC reference). The “No Stopping” sign is very close to the “No Parking” sign in design. The CASATC types lack the blue center found in the Protocol. In a reversal of roles, the UN provides a separate plate for selective “No Stopping” zones.

CASATC informative signs provide an unusual appearance: they present a combination of what would be expected in informative signs and also what would not be expected (CASATC 1950, Appendix III, Schedule 1). What would be expected are the categories of “Advance Direction and Direction” signs, as well as that of the category of “Place and Route Identification” signs. “Indication” signs are also included, though that heading is absent. Instead, the signs are included under the general “Information” signs heading. (CASATC 1950, App. III, Sch. 1).

What would not be expected are many signs that would normally be classified as danger warning signs but which are included, along with the previously described category, and all under the “Informative” signs heading (CASATC 1950, Appendix III, Schedule 1). CASATC has removed the triangular shaped portion with red border and white ground, but then included the rectangular portion (for example, a curve sign) without the designation “dangerous.” The end result is a curious amalgamation of what non-African observers would term “Information” signs, and “Warning” signs, though missing a key component from the viewpoint of CASATC. (CASATC 1950, App. III, Sch. 1).

A review of other CASATC “Information” signs

shows a system of signs akin to UN 1949 in many instances. The CASATC “Parking” sign is blue in color, as in the UN model, but the “P” of the sign is smaller and the qualifying information is inscribed on the sign rather than on a separate plate; this is the reverse of the UN practice (CASATC 1950, Appendix III, Schedule 1). This is the only CASATC sign that has a blue ground. The “Hospital” sign has a yellow ground with a red cross within a black circle and accompanied by an “H” in black. The “Major Road Ahead” sign (known as a “Priority” sign in the Protocol, and as the “Yield” sign, in the US) is found among informative signs and not with the danger warning signs (also UN 1969 CORSS, 112; US 1961 MUTCD, 29). Nonetheless, the sign is very similar to the UN version.

CASATC “Advance Direction,” sub-divisions of informative signs, and “Direction” signs are much akin to UN types (CASATC 1950, Appendix III, Schedule 1.). CASATC requires black ground and white graphic and word symbols for these signs. The “Place and Route Identification” signs are confusing in that a distinctly direction sign (and one so labelled) is included under the “Place and Route Identification” heading. Also included are place names, descriptive signs, and route markers. All of these signs continue the white on black motif. The route markers are rectangular in shape (the vertical dimension is the longer dimension). A category of “Temporary Road Signs” follows the CASATC “Prohibitive and Mandatory” signs in color and shape format. These include a “Road Closed” and “Detour Ahead” (with arrow) signs. “Stop and Go” signs, in the temporary form, are circular with a red ground and the inscription “STOP”; and circular with a green ground and word inscription “GO” in yellow.

1D Traffic Signals and Traffic Markings to 1950

1D1 Introduction

Many older TCD systems lacked any mention of Traffic Signals or Traffic Markings. And those systems and documents that included these aids did so only briefly. Admittedly a regional or global system of traffic aids will address some topics less fully than a manual or handbook of aids for a nation or region. And early stages of new aids will receive scattered coverage but no systematic coverage let alone inclusion in handbooks and conventions. The end result is sparse coverage of signals and markings for whatever reason. Older TCD systems therefore gave most or all of their attention to Traffic Signs. This resulted in ample coverage of signs by international agreement and by regional efforts but little coverage for Traffic Signals and Traffic Markings.

This sub-chapter will therefore take up Traffic Signals and Traffic Markings for all parts of the world in a single limited unit in contrast to system and regional units for Traffic Signs. The review begins with the early 20th century and continues to and concludes with the CASATC system in 1950. 1D2 reviews Traffic Signals and 1D3 takes up Traffic Markings. Traffic Signals in a formative sense is often outside of formal systems and coverage of various topics, systems, regions is often not extensive. Further information can be found in the the TCD history (Part J) in this Series. The TCD Database (Part Iii) provides information on types and terms of various aids with a historical dimension.

1D2 Traffic Signals

Traffic signals date back to 1968 in London. But that was a solitary installation (Webster 1966, 2). Traffic signals in experimental or small scale use is a different matter from general usage. And traffic signals in general use in national or regional use may differ from a global agreement. Perhaps the earliest inclusion of signals in a major agreement is that of the US in 1930. In that year a *Manual on Street Traffic Signs, Signals, and Markings* was published by the American Engineering Council. It included a basic color code of red=stop, green=proceed, yellow=caution.. A three-color signal was recommended but two-color (red and green) was permitted. The exporting of US practice into the hemisphere justifies inclusion of this national material here.(Hawkins 7-92, 26).

The first of many editions of MUTCD (*Manual on Uniform Traffic Control Devices*) was promulgated in 1935. This document was a merger of older urban and rural documents. The three-color signal became standard and all signals were to be eight inches in diameter. Arrows in green became official. And pedestrian signals displayed walk/wait messages. A 1939 revision of the first edition added rectangular shaped pedestrian signals. The 1948 edition of MUTCD offered two forms of pedestrian signals: circular with walk/wait and rectangular with walk/don't walk. Lane control signals for reversible lanes were introduced. (Hawkins 8-92, 20-21; 11-92, 17-18). By the 1930s and probably in the 1920s, the basic pattern of color and meaning was established. And those factors carry over into all codes for signals.

Evans notes that signals became "general use" aids in Germany in 1926 and two years later in the United Kingdom (Evans 1950, xii). Tripp, however, notes the a

system of signals was employed in Paris by 1922. That system employed single-head signals in red. When on the signal projected a message of stop; when off the passive message of proceed was given (Tripp 1950, 258). Webster refers to traffic signals in use in London in 1925 and 1926 but these may not have been of general use (Webster 1966, 2-3).

The first coverage of traffic signals in an European-influenced document is found in the Protocol (UN 1949 Protocol, 107-109). The documents provide for a three-color system of red, green, and amber. And a two-color system of red and green. In the second case a combination of red and green signal can serve the purpose normally fulfilled by an amber signal. Flashing amber is permitted in the Protocol, but no mention of flashing red is to be found except for railway or level crossings. (UN 1949 Protocol, 107-109).

A somewhat extensive coverage of traffic signals is given in CASATC. Signals are here considered under the unusual heading of "Traffic Light Signs". Despite the inclusion of the word "sign" only standard lighted signals are included in the CASATC treatment (CASATC 1950, Appendix III, Schedule 1). Standard signals are termed "Robots" in the CASATC system. These exhibit the lights in the normal vertical arrangement with red at top, yellow in the middle, and green at the bottom. Flashing red lights, known as "Flash Lights," are flashing lights mounted on a red-boarded triangular-shaped sign; and these "Flash lights" indicate danger. A similar signal, but affixed to a circular sign (in red) accompanied by a rectangular yellow plate, indicates "Prohibitive with flashlight." A "bollard" with message "Keep Right") is internally lighted. (CASATC 1950, Appendix III, Schedule 1).

1D3 Traffic Markings

This coverage influenced substantially by *T-M History* (Part J in this Series). Pavement Markings has become a significant part of TCDs in the 20th century. There are only limited references to such aids in the 19th and early 20th centuries. Admittedly such aids were a minor aid in that time. Lay and Sessions note the use of various kinds of surface markings from the 1880s to near 1920. A PIARC Congress in 1913 made some reference to Traffic Markings. (Lay 1992, 191; Sessions 1970, 101-103).

Hawkins notes the increased references to traffic markings in various editions of US MUTCD. The 1935 edition included centerlines for hazardous locations though not for general usage. Traffic lanes, pavement edges, crosswalk boundaries were also included. Surface markings colors were dictated by what gave the greatest contrast with the background. Colors included white, yellow, black. (Hawkins 8-92, 18-19). A 1939 revision of the 1935 MUTCD added no-passing markings. (Hawkins 8-92, 20). A pre-MUTCD publication, *Manual on Urban Traffic Control Devices* was published in 1930 by the American Engineering Council. (Hawkins 7-92, 26).

In 1948 white became standard color other than double centerlines and no passing lines. Those uses employed yellow (yellow was recommended with white as an alternative). The use of pavement edge lines, a common contemporary practice, was disallowed in 1948 though approved in 1935. It was thought that confusion of such lines with centerlines or lane lines might occur. (Hawkins 11-92, 17).

The first mention of pavement markings in an

European-based publication is also found in Protocol (UN 1949 Protocol, 111-112, TISRP) though the provisions are not extensive. This is understandable since that publication was the pioneer work for such regulations. Lane markings (presumably center-lines) are applied where necessary. Protocol included guidelines on their use. Edge reflectors are included for necessary situations. Reflectors are to be red in color or orange for the "direction of traffic" while white is employed for the opposite side. White or amber reflectors mark various kinds of obstructions in the actual roadway.

Road Markers (CASATC 1950, Appendix III, Schedule 1) are comprised of "Pedestrian Crossing-markings" presumably for road edge markings. The latter is composed of a white ground and either small red circular reflectors or red diagonal stripes. Level-crossing norms follow the UN pattern, though a variant form of the level-crossing sign listed as a "Warning Cross" (the rectangular version is labelled as a "Level-crossing Stop Sign") has a black and yellow-striped cross as opposed to the red and white motif of the regular type.

While OBS focussed primarily on signs they also gave some attention to traffic markings. The growing use of carriageway (or pavement) markings was independent of signs yet the two developments were often parallel to a considerable degree. (UK HADTS Addendum, 4-5, TISRP). Carriageway markings, seemingly, began in Britain during the early Victorian period though they did not become relatively commonplace until after World War I. And it was not until 1926 that an official circular (MOT circular #238) published guidelines on the usage of white lines. The "1933 Committee" then incorporated Circular #238 into its own work. The report of the "1933

Committee” noted three primary purposes for white lines: as stop lines, curve markings, and junction and corner markings. The committee also recognized white lines for marking “street refuges” as well as other obstacles in roadways. Though the committee showed awareness of centerline markings in the US, it did not address the matter. The range of pavement markings was expanded by the 1944 Committee; these new usages included lane markings. Reflective “buttons,” commonly referred to as “Cats-eyes” in England, were first installed in 1935 and became very common on road and were of especial value in times of restricted visibility.

CHAPTER TWO

CLASSIFICATION WITH EXPLANATORY NOTES

2A The Classification Revisited

2A1 Introduction to Chapter 2

Originally this chapter (in the first edition) was intended to focus exclusively on a simple classification of international traffic control devices accompanied by the necessary explanatory notes. However, it became evident that a rethinking of the basis of the classification system, as found in the original work (Parts A, B, C/D 1st [and unitary] edition, 1981) would be required in order to obtain a more precise and meaningful classification of markings. The first segment of this chapter will therefore examine the matter of the classification system itself accompanied by necessary classifications and revisions of the original system.

The revisions, or “revisits” will pertain to all forms of Transportation-Markings and not merely traffic control devices in this specific study. This coverage will consider both the extensive classification of types of markings and the more limited classification of the types of messages.

The first edition of Part E contained a single classification with both main and sub-forms together. The idea of variant classifications first arose with the railway study in 1991. A variant classification for tcd was fashioned for the general classification study (1st ed, 1994). This edition contains both main and variant classifications along with necessary explanatory notes for both.

Chapter 2A contains only limited revisions from the first edition. However, Chapter 2B classification materials and accompanying notes have undergone major changes and, in some instances, drastic changes.

2A2 The Revisiting of the Classification

a) The 4th Digit Problem:

Aids Affected by it/Aids not Affected by it

It became obvious even in the very early stages of the 1st ed of this work that either changes in the classification system of types of markings were necessary or, at the very least, improved explanation of the existing system were needed. The most serious problem centered on the meaning of the fourth-digit of the classification number. The fourth-digit number appears to represent a single, unitary transportation-marking but that suggests more precision than was always the case. While the fourth-digit was not intended to represent a category of markings in actual practice it often did just that.

That problem centered on markings capable of producing more than one message as well as those not so capable. Markings with multi-message capabilities include fewer types since those types can display a variety of messages from each unit. Therefore they do not constitute a wide range of independent, though closely-related, aids. But markings with a capability of a single, narrow-focussed message do constitute a vast range of types. Regular traffic signals are an example of a single marking capable of producing several different messages. By contrast, traffic signs can produce, in most instances, a single message and as a

result they represent a great number of separate markings resulting in a broad series of closely-related aids. Further explanation of the basis of signals and signs and their relation to the classification is needed.

A lighted traffic signal consists (this is also true of marine lights, aero lights as well as many others) of a housing, a power source, a message-producing mechanism and a means of projecting the messages that have been produced. A traffic signal can present to the viewer one of several states (and here the resemblances to marine, aero lights are less): an inactive one if the signal is not functioning; an active one if functioning. The active state can provide one of several messages: proceed, caution, stop. It is not difficult to say, "here is the signal mechanism," and "over there are the light waves which make up the physical message." In other words, one can break down the components of a functioning traffic signal. The signal and message constitute an integrated whole but one in which the components can be separated.

But if one then examines a traffic sign a problem occurs in separating message from message-producing function. The physical sign (concrete, metal sheeting or wooden board, various kinds of fasteners), and the message (symbols of varying sorts made up of painted, embossed, or taped materials) constitute not only an integrated whole but a single unit. One can hardly speak of the physical dimensions of the signs without also speaking of the actual message of that sign. This also means that the variety of signs forms an innumerable mass that cannot be separated into structure and message since the extreme closeness of structure and message means that each type of sign represents a separate aid. This contrasts with signals of which only a limited number of types exists since the

messages produced can be distinguished from the message-producing dimension. Signal types can be divided into categories that give some information about the message but the classification of signals is primarily one of tangible types of physical markings not messages.

b) Classifying Principle: 4th-Digit May Represent

Categories Not Separate Aids

The classification at this level becomes one of classifying categories rather than individual signs. It is reasonable to say that each sign with its message is a single and independent marking but then the classification -- if pursued to a logical conclusion -- becomes bloated with hundreds and even thousands of signs. But if one views a classification of markings as including physical markings and not message emanations, then it is necessary to eliminate words such as "warning signs" since "warning" refers to the type of message and not to the type of marking. And that may seem to be the correct response. But choosing that course of action has the result of including a vast number of types of signs under a single reference which, in turn, seems to be an inadequate response to the numbers and types of signs in use.

Both of the previously stated positions -- that of classifying and listing individually every sign which varies ever so slightly from other signs, and that of listing vast quantities of signs as a single group -- are not acceptable responses in the view of this compiler. However, the apparent lack of some other response largely superficial and stems from a misconception about the nature of Transportation-Markings. T-M forms -- and not just traffic signs -- incorporate factors, including message-producing factors,



which may not be intrinsic to the physical marking. Those other forms of markings, whether trackside signals, marine aids to navigation or traffic signals, are in reality, not pure isolates (see Appendix I, Glossary of Terms). The design of markings reflect very much the geographical, transportation infrastructure, and interactions between signals and humans and/or transportation modes.

In short, there are few forms of signals that have not incorporated, in some manner or other, an extraneous influence. A signal arriving at its intended site in a sealed packing crate has already been affected by outside influences. For example, a trackside signal includes a form of signal designed for a specific location (mainline track) and it excludes other locations (sidings, railway yards, etc). These signals include specified signal aspects and indications. In large part the outside physical and transportation world forms the "destiny" of that signal. A switch signal also has precise functions and locations. Those signals, frequently found in switching yards, exhibit a narrow range of aspects and indications; in fact such a signal may do no more than display a "stop" or "go" message.

All markings are therefore affected by the location, by the requirements of traffic patterns, by the mode of transportation, by the physical terrain. All markings contain a message dimension, but markings do not contain that dimension in the same way. Signs manifest the message directly by displaying the message produced; other markings may incorporate it by the construction of the signal or by the placement of the marking. One cannot create a pure isolate marking impervious to the "outside world."

What does this mean for the classification?

1) It means that factors outside of the marking themselves are not extraneous to the marking (though apart from the precisely physical dimension) but are an integral factor to be considered with the marking. These can and do include message factors.

2) Since markings capable of a single, narrow message can result in a mass of markings closely related and yet remaining independent, it is very difficult to individually classify them. The final digit of the classification must represent categories, not individual marking in those cases.

3) It can be reasonably argued that such appellations as “warning” in a general sense refer more to geography than to a message. Only the specific designation (for example, “warning sign -- sharp bend”) can be considered a message.

4) It is finally necessary to examine the brief classification of types of messages from Part A so that it can become more workable. This second classification can help pinpoint those markings that needs be classified by categories and not by individual members.

5) The principle of classification remains coherent and consistent. Markings are, in the last analysis, classified according to the state that is irreducible (subject to interpretation according to the classification of message types).

2A3 Changes in Classification: Messages

Part A, *Foundations*, in the original volume, provides a classificatory schema but that early version contains a short-coming which became only apparent with the first edition of this work. That classification in its original state comprises a four-fold division:

- 1) Changing message/multiple message (C3M).
- 2) Changing message/multiple message (CMSM).

- 3) Unchanging message/multiple message (U3M).
- 4) Unchanging message/multiple message (UMSM).

It then became apparent that the UMSM category not only cuts a wide swath across a major portion of Transportation-Markings but also brings together types of aids that need to be further differentiated within the UMSM category. UMSM includes not only road and other signs but also a great many marine and aero lights whose mechanisms bear resemblance to many road and rail signals. Since marine and aero lighted markings exhibit a single message they were assigned to the same category to which traffic signs we assigned. UMSM includes disparate mechanisms and devices that can project a variety of messages (but not at the same time); it also includes those aids unable to project anything other than a single message. Placing objects together that share one characteristic but clash on other points is a less than desirable “solution” even in a very truncated classification.

The necessary change in the category can be accomplished by the establishment of sub-categories for the UMSM category. The components of UMSM exhibit one of two message characteristics: either they produce one message at a given time (though they can be programmed for other messages), or they produce a single message, and are incapable of producing any other message (unless the marking is so altered that it becomes a new type of marking). Marine lights are examples of the former situation and thereby belong to sub-category I or “Programmable Transportation-Markings.” Traffic signs are examples of sub-category II, “Unitary Markings.”

Sub-category II needs further differentiation into variants. Some classes of signs or other markings have a

single form of message and admit of no variation. For example, a stop sign has a single message. Such classes of markings can be categorized as Variant "A". "B" variant is an intermediate one that allows one of several predictable versions. For example, turn signs come in right, left, and "hairpin" turn forms as well as other configurations. The basic sign can vary but only within prescribed limits. "C" variant includes those markings about which few if any predictions can be made. These can be labelled "Individual" and would include, for example, information signs giving the names of towns and the distance to them. This last group is individualized to the extreme and only the most general statements about the message content can be made.

Programmable markings, since they are very much individualized, cannot be easily sub-divided except in broad categories. For example, the US Coast Guard publishes charts of the types of light messages (flashing, occulting, isophase, etc.) but would require a light list to know the exact character of each light.

2B Classification and Notes

2B1 The Main Classification

41 Traffic Control Signals

411 Standard Signals

4110 Traffic Signals

4111 Pedestrian Signals

412 Special Signals

4120 Cyclist Signals

4121 Flashing Beacons

4122 Level (Railway) Crossing Signals

4123 Lane-Use Control Signals

4124 Movable Bridge Signals

- 4125 Emergency Signals
- 4126 Ramp-Control Signals
- 4127 Miscellaneous Signals
- 4128 Lighting Devices
- 42 Partially-Lighted TCDs
- 421 Lighting Devices
 - 4210 Warning Lights
 - 4211 Steady-Burning Electric Lamps
- 422 Signs [This pertains to listing of signs in unlighted classification. When lighted such signs are preceded by "4"]
- 43 Unlighted TCD Signs & Markings
 - 431 Warning Signs
 - 4310 Roadway Alignment Signs
 - 4311 Roadway Conditions Signs
 - 4312 Intersection Signs
 - 4313 Intermittent Moving Hazards Signs
 - 4314 Construction & Maintenance Signs
 - 4315 Level/Grade Crossing Signs
 - 4316 Other Dangers Sign
 - 432 Regulatory Signs
 - 4320 Priority Signs
 - 4321 Prohibition & Restrictive Signs
 - 4322 Mandatory Signs
 - 4323 Standing & Parking Signs
 - 433 Informative Signs
 - 4330 Distance & Direction Signs
 - 4331 Route Markers
 - 4332 Mile Posts
 - 4333 Signs of General Interest
 - 434 Horizontal Markings
 - 4340 Longitudinal Markings
 - 4341 Transverse Markings
 - 4342 Multiple-direction Markings
 - 4343 Graphic Markings

- 4344 Alphanumeric Markings
- 435 Vertical Markings
 - 4350 Barricades
 - 4351 Channelizing Devices
 - 4352 Delineators
 - 4353 Object Markings

44 Sound Traffic Signals

- 440 Signals with Single Forms
 - 4400 Movable Bridge Signals
- 441 Signals with Variant Forms
 - 4410 Audible Pedestrian Signals

2B2 Explanatory and General Notes

41. The UN Conference of 1968 will be a key source of terms in the classification. However, it will not be an exclusive source. National practices and other documents past and present also enter into the discussion. Traffic signals are divided into two categories by the 1968 Conference: "Signals for vehicular traffic" and "Signals for pedestrians only" (UN 1969 CORSS, 5). The UN documents do not mention other types of signals under a heading of signals. But the publications of that conference discoursed on the flashing and non-flashing of lights, pertinent colors and applications. It is feasible, based on those written materials, to speak of signals in a more precise and comprehensive sense and to extrapolate terms for types of signals when necessary. One area of uncertainty is that of the "flashing beacon" ("traffic beacon" in 1st ed). This type of marking, a common feature at intersections in the US and a variety of other nations, is only partially included by the UN. The UN Conference refers to amber flashing beacons and red flashing beacons for special purposes (UN 1969 CORSS, v.) but a general purpose red flashing beacon was

not given consideration though several signatories make very extensive use of such signals.

It has become necessary to add terms to descriptions of the UN coverage. This action was prompted by lack of formal names for those devices described but not formally named. These added terms, often US ones, may be somewhat imprecise since they are of an unofficial nature. But they are required for labelling descriptive phrases lacking names. The classification precludes inclusion of descriptive statements because of its format.

There are at least two possible approaches to classification of signals in this study: listing all signals as single types under one general number, or dividing the signals into standard (those for which the UN provides a special heading: traffic signals, and pedestrian signals (UN 1969 CORSS, v), and into special signals. The second approach has been adopted; 411 so designates standard signals. Variant and specialized forms are in the variant classification.

4110. What is here termed the standard traffic signal can be divided into types of operation, but for this classification the one heading can suffice. Older US MUTCD editions divide traffic signals into traffic-actuated, centrally-controlled, and isolated-controlled. This is appropriate for the U.S. but that level of detail is absent in this study. US MUTCD 1988 has two forms: pre-timed and traffic-actuated (US MUTCD 1988, 4B-1). 4111. Pedestrian signals can exhibit a variety of nuanced differences, but the single heading should be sufficient.

412. Special Signals included four specific forms in the 1st ed and a fifth miscellaneous segment. That last segment

drops out here and three additional specific components are added. 4120. Cyclist Signals exhibit a symbol which separates this signal from exclusively-light traffic signals. The UN describes this signal but does not give it an actual name (UN 1969, CORSS, 93-94). Standard traffic signals, not infrequently, include bicyclists. 4121. The Flashing Beacon (termed traffic beacon in the 1st ed) is included in the main classification since it is a signal for some nations, and because some UN signals correspond to that designation. The introductory paragraph in this chapter provides some background on the problem of flashing beacons.

4122. Railway Crossing Signals (termed Level Crossing Signals in numerous parts of the world) are part of railway organizations oft times though providing warnings to road users. These signals can have unlighted dimensions as well as sound aspects. 4123. Lane-use Control Signals often display arrows and crossed bars. They are adjuncts of the standard signal pattern but carry out a more specialized function. 4124. Movable Bridge Signals include movable bridge signals but what are termed drawbridge signals and swingbridge signals. 4125. Emergency Signals frequently refer to fire truck movements. 4126. Ramp-control Signals are listed in US MUTCD though not restricted to the US. 4127. Lighting Devices is a US term. It does not refer to signals but instead to devices marking construction zones and other temporary situations that are potentially hazardous. There are a variety of forms which are listed in the Variant Classification. 4128. Miscellaneous Signals. These forms are only infrequently included in traffic control device publications. Specific forms are in the Variant Classification and include signals for ferry-boat landings and low-flying aircraft (UN 1968).

43. Unlighted Traffic Signs and Traffic Markings. In

this study the second major subdivision of TCD is that of signs and markings. The differences between signs and markings are such that a bifurcated classification is possible. However, since they share the basic characteristics of visual and unlighted aids they can constitute a basic subdivision. Traffic Markings refers in large part to surface (or pavement or road or carriageway) markings. However, object markings frequently have a vertical dimension. The word "Unlighted" (absent in 1st ed though present in "H") adds a degree of precision as to the meaning of marking in a TCD context. Classification of signs has undergone many changes from the 1st ed to the 2nd ed. Signs can have a lighted dimension though the unlighted is more significant. A variety of signs are now found in the variant classification.

431. Warning signs are substantially revised from the 1st ed. This revised version follows the configuration found in the Database. The remarks earlier in the chapter regarding classification problems pertains to these signs as well. There are more than 20 major forms of warning signs in UN 1968 and many of these contain sub-forms. Some signs are divided into European and US models. Major forms are included here while others are in the variant classification.

4310. Roadway alignment signs encompasses bends, curves, turns and related functions. This term replaces Roadway and Environ signs category in the 1st ed. 4311. Roadway Conditions signs includes, in part, Other Danger Signs I and II from 1st ed. 4312. Warning Signs at Approaches to Intersections is now simply Intersection Signs. 4313. Intermittent Moving Objects replaces Interaction of Vehicles with Other Moving Object signs from 1st ed. 4314. Temporary Warning Signs for Constructions is superseded by Construction and

Maintenance Signs. 4315. The word Level is added to railway crossing since it is the basic term in many nations. 4316. Other Dangers Signs. The 1st ed included two such categories: one for dangers as listed in the several annexes of UN 1969 document (UN CORSS, 112-113), and one for dangers which did not fit the categories of this classification. A single Other Dangers segment is included for the 2nd ed. Some danger signs are listed in Roadway Conditions, and others are of a variant form and therefore located in the Variant Classification.

432. Regulatory signs have three distinct subcategories: priority, prohibitory, and mandatory. The 1st ed subdivided priority into two segments. However a single segment suffices in this edition with necessary additions attached to the variant classification. The 1st ed included four segments for prohibitory, one for prohibitory and restrictive, and one for an end to prohibitory and restrictive signs. 4320. Priority Signs includes two functions: signs for intersections and signs for narrow sections of roads. 4321, Prohibitory and Restrictive Signs incorporates that segment along with segments for turns, passing, speed limit, miscellaneous and single forms. The Variant Classification includes entries formerly in main categories. 4322. Mandatory Signs has no sub-categories but instead includes a variety of specific forms. This is true for both editions. 4323. Standing and Parking signs is a separate group within regulatory signs for UN 1968; it was also separate for the 1st ed but it is now part of regulatory signs.

433. Informative Signs. This category in 1st ed (Part E) has been greatly changed for the General Classification, 2nd ed (Part H). That revised form is mirrored here. The 1st ed of both Parts E and H had eight subdivisions based on UN 1968. However, five of the groups can be reconfigured

under a single heading of Distance and Direction Signs, 4340. This reflects US and IAMM practice. Related practices in GERSS 1952 and Canada lead in that same direction. 4331. Route Markers were not listed in 1st ed. However, previously-mentioned systems as well as ECAFE employ that term. Road Identification Signs in 1st ed correspond to Route Marker. 4332. Signs of General Interest (This term originates in the Database and is a misnomer: it should read Signs of General Interest [from UN GERSS 1952]) This segment incorporates two elements both of which previously employed lengthy and awkward titles: Signs "providing useful information for drivers of vehicles", and Signs giving notice of "facilities which may be useful for road users".

434. Horizontal Markings. Surface and vertical markings underwent major changes in 2nd ed of the General Classification. 434 includes all surface markings in major forms with specific forms in the variant classification. 4340. Longitudinal Markings. This 4-digit segment encompasses the five segments of the former 3-digit category of 445 in the 1st ed. 4341. Transverse Markings plays a similar role for the former category of that name. 4342. Multiple-direction Markings offers a rather awkward term for surface markings travelling in more than one direction. It was coined for the 2nd ed of Part H and it represented an attempt at encompassing non-longitudinal and non-transverse markings involving lines that extend in more than one direction. But it has proven to be less than precise. The markings include a variety of standing and parking markings, oblique parallel lines and perhaps small elements of other groups. 4343. Graphic Markings includes arrows and other graphic symbols except for alphanumeric forms. 4344. Alphanumeric Markings includes word and numerical symbols on road surfaces.

435. Vertical markings is a category new to the database and then to the 2nd ed of the General Classification. It recognizes the importance of vertical objects and/or accompanying symbolic forms. This was lacking in the 1st ed of Part E. Obstruction Markings was employed in that classification and Obstacle markings in the 1st ed of the Classification. But those categories, though they partially included vertical markings were, nonetheless, incomplete. A variety of these forms are from the US and other nations. They include 4350. Barricades, 4351, Channelizing Devices, 4352. Delineators, and 4353, Object Markings. Some delineators are of a surface form and thereby part of one or other surface marking segment rather than this category.

General Note

The 1st ed of Part E included several notes that compared and contrasted US and Canadian practice with that of UN 1968. While it may appear parochial to include detailed comparison of a global system with two North American national systems it may also provide insights into the arrangements of major categories of signs. A slightly reworked version of those notes is hereby enclosed.

It becomes rather difficult to sum up points of commonality and lack of commonality between US and UN practices on warning signs. In large part this is because there are no clear and precise groups of warning signs. This is in sharp contrast with the practice found with regulatory and informative signs. This has resulted in an interpretation of the documents in order to construct the classification. The main segment of UN danger warning signs has 19 components and no overarching term of inclusion. In the 1st

ed these signs were placed under a heading of Roadway and Environ Signs. In the 2nd ed they are termed Roadway Alignment Signs. The US pattern has no subdivisions as such except specific and restricted operational groups. A very general list of locations and hazards presents 11 segments and no encompassing term. Canada, by contrast, presents a concise classification of warning signs: "Physical condition, Regulation ahead, Intermittent moving hazards, Temporary conditions, and Miscellaneous warning signs." (Canada A1.03 Class W). The Canadian practice can be instructive in building a classification.

The UN divides all regulatory signs into three major categories of Priority, Prohibitory, and Mandatory signs. These are, in turn, subdivided into specific components of usage. The US divides regulatory signs into a series of smaller, more specific operational groups and sub-groups. Canada has three major groups with one group (Road Use Control) divided into specific sub-classes.

US Guide Signs (rather than Informative signs) are divided into three broad categories in contrast to the UN which has eight groups. Canada has four categories.

2B3 Variant Classification for Traffic Control Devices

1 All Lighted Signals

412 Flashing Beacons

.1 Traffic Signals

.10 Flashing Beacons

.100 Warning Beacons

.101 Speed Limit Beacon

.102 Intersection Control Beacon

.103 Stop Sign Beacon

- .11 Lighting Devices
 - .110 Flashing Warning Beacon
 - .111 Steady-Burning Electric Lamp
 - .112 Warning Light (3 forms)
- .12 In-Roadway Lights
- .13 Miscellaneous Signals
 - .130 Ferry-boat Landing Signals
 - .131 Low-flying Aircraft Signals
- 43 Unlighted Signs
 - 431 Warning Signs; 432 Regulatory Signs; 433 Informatory Signs
- .2 Signs and Markings
 - .20 Warning Signs: Roadway Alignments & Roadway Conditions
 - .200 Crosswinds
 - .201 Bends (Four forms)
 - .202 Descent/Ascent
 - .203 Swing Bridge
 - .204 Roads Leading Onto Quay or River Bank
 - .205 Uneven Road
 - .206 Slippery Road
 - .207 Loose Gravel
 - .208 Falling Rocks
 - .209 Carriageway Narrows
 - .21 Warning Signs: Intermittent Moving Hazards
 - .210 Pedestrian Crossing
 - .211 Children
 - .212 Cyclists Entering or Crossing
 - .213 Cattle or Animal Crossing
 - .214 Aircraft Crossing
 - .215 Two-way Traffic

- .22 Warning Signs: Railway (Level/Grade) Crossings
 - .220 Warning of Level Crossing with Gates or 1/2 Gates
 - .221 Warning of Other Level Crossings (Two Forms)
 - .222 Warning of Intersection with Tramway Line
 - .223 Signs to be Placed in the Immediate Vicinity of Level Crossings (Three Forms)
 - .224 Additional Signs at Approaches to Level Crossings (Three Forms)
- .23 Regulatory Signs: Prohibitory or Restrictive Signs: Entry Forms
 - .230 No Entry (One sign, two models)
 - .231 Closed to all Vehicles in Both Directions
 - .232 Entry Prohibited for Category of User or Vehicles (Ten Forms)
 - .233 Entry Prohibited for Several Categories (Several Forms)
 - .234 Entry Prohibited for Vehicles Whose Weight or Dimensions Exceed Certain Limits (Five Forms)
 - .235 Distance Between Vehicles
- .24 Prohibitory or Restrictive Signs: Other Forms
 - .240 Prohibition of Turning (Two Forms)
 - .241 Overtaking Prohibited (Two Forms)
 - .242 Overtaking by Goods Vehicles Prohibited (Four Forms)
 - .243 Speed Limits
 - .244 Use of Audible Warning Devices Prohibited
 - .245 Prohibition of Passing Without Stopping
 - .246 End of Prohibition or Restriction

- .247 End of Particular Prohibition (Two Forms)
- .248 Prohibitive or Restricting Standing And Parking Signs
- .25 Mandatory Signs
- .250 Direction to be Followed
- .251 Pass this Side
- .252 Compulsory Roundabout
- .253 Compulsory Cycle Track
- .254 Compulsory Foot-Path
- .255 Compulsory Track for Riders on Horseback
- .256 Compulsory Minimum Speed
- .257 End of Compulsory Minimum Speed
- .258 Snow Chains Compulsory
- .26 Horizontal Markings: Longitudinal and Transverse Forms
- .270 Traffic Lane Markings
- .271 Continuous Lines for "Particular Situations"
- .272 Carriageway Limit Lines
- .273 Obstruction Markings
- .274 Guide Lines for Turning Vehicles
- .275 Stop Lines
- .276 Yield Lines
- .277 Pedestrian Lines
- .278 Cyclist Crossing Markings
- .27 Horizontal Markings: Multi-directional, Graphic, Alphanumeric Forms
- .270 Arrows
- .271 Oblique Parallel Lines
- .272 Word Markings
- .273 Obstructing Markings
- .28 Vertical Markings
- .280 Objects--Within Roadway

- .281 Objects--Adjacent to Roadway
- .282 Objects--End of Roadway
- .283 Delineators-Curb
- .284 Delineators-Upright
- .285 Channelizing Devices--Traffic Cones
- .286 Channelizing Devices--Tubular Markers
- .287 Barricades--Portable
- .288 Barricades--Permanent

General Note

Traffic control devices lacked a variant classification in the 1st ed (1984). A TCD variant classification was added to the 1st ed of the Classification (Part H, 1994). And a somewhat revised version of the Variant Classification is included in this chapter.

The classification consists of two categories: .1 Traffic Signals which is of brief duration, and .2 Traffic Signs and Traffic Markings; the second subdivision is more extensive. A variety of traffic signals in flashing mode are not recognized by UN 1968. However, they are included by various nations and probably organizations. Hence, their inclusion here.

The plethora of signs prevented a comprehensive listing in the 1st ed of Part E. However, a broad range of signs is included here. The coverage focusses on UN 1968 materials. National differences could not be extensively included due to space limitations. The UN documents provide clear indications of the types of signs in use. The US and, to some degree, the Western Hemisphere nations employ a wide range of surface and vertical markings. Many significant forms are included here. The UN's coverage of such markings is less encompassing.

CHAPTER THREE
TCD SYSTEMS GENERATING AGENCIES
AND TRAFFIC SIGNALS

3A Introduction

3A1 Introduction to Chapter

While many forms of Transportation-Markings can be reviewed with only limited reference to the sponsoring agency that is not possible with Traffic Control Devices. The diversity in kinds of aids is closely tied to the group or conference that established the aids. Hence, part of this chapter is devoted to the formal events of whatever form that developed systems and individual T-M forms. This review (3A) will include all forms of TCD (Traffic Signals, Traffic Signs, Traffic Markings). Ch 3B focusses entirely on Traffic Signals.

The first chapter of this study examined the development of TCDs before 1950. That year may be an arbitrary dividing point between an older era and a more contemporary phase. Yet the older efforts, including UN 1949, were substantially of a regional nature. It was global by intent but it followed the European system which gradually spread beyond Europe. It was not until GERSS 1952 that a more global stance became visible. Regional efforts since 1950 are influenced by, tied to international efforts especially that of UN 1968. A plethora of activities took place before 1968; this is the focus of 3A.

Ch 3B will examine traffic signals in several segments: Signals 1952-1967, UN 1968, and Changes since 1968. The first edition ended in 1984. This edition includes events since 1984.

The period of time after UN 1949 Protocol and before UN 1968 Convention was not a fallow period. Seeds that would enhance cooperation and increase uniformity, and seeds that would foster increased divergence and disagreement were both planted in this interim era. Growth in and harvests of those seeds were also factors in this time. The most significant event of that near two-decades was the UN Draft Convention of 1952 (Group of Experts on Road Signs and Signals or GERSS). For a time that effort offered renewed hope for a truly international agreement on TCDs.

Other noteworthy events of 1950-1967 included formulation of an *Inter-American Manual* for much of the Western Hemisphere. That document brought together some of the best features of existing (and conflicting) systems. Canada embarked on a study of TCDs that has achieved what is perhaps the most sensible system available. United Kingdom, Scandinavia, Central America, Ireland examined their respective systems of traffic signs, traffic signals, traffic markings and forged new approaches to solving traffic safety challenges.

3A2 The UN Draft Convention, 1952

The "Group of Experts on Road Signs and Signals" (GERSS) was created for the purpose of continuing the goal of the UN Conference on Road Traffic (1949). The goal of UN 1949 was to create a global "unification of Road Signs and Signals" but this was not accomplished at that time (UN 1952 GERSS, 1). The Road Signs and Signals concept (hereafter RSS) of the 1949 attempt was based on earlier agreements which were nearly exclusively European. The 1949 Draft Convention was an updated and expanded version of what is often termed the "European

System” (or even the “International System”) (UN 1952 GERSS, 1). However, a different system had grown up in North America and elsewhere in the Western Hemisphere. The European system was an approach that had undergone more work than what can be termed the “the American System.” Nonetheless, the latter had become quite influential throughout the hemisphere (UN 1952 GERSS, 7-8; on the use of the phrase “American System” see UN 1968 PSOC-RSS, 2).

The 1949 Convention had approached road signs on two levels: 1) A statement of very general principles in the Convention accompanied by 2) And a Protocol of “detailed provisions” (UN 1952 GERSS, 8-9 TISRP). The participants in 1949 found little complaint with the general principles but they failed to agree on the detailed Protocol. Agreement could not be achieved because of the existence of two systems of signage: European and American. This problem was, in turn, exacerbated by the various combinations of those systems that were in use in various nations and regions. The 1949 Convention was opposed to the notion of multiple protocols since that would necessitate a choice “between two entirely different systems” for individual nations. Finally, the hopes for a single amalgamated system prevented serious consideration of a double-protocol approach. The *Final Act* of the Conference (Par 7 (h)) took into consideration the lack of an agreement but commented favorably on the “general desire to arrive at a later stage at the establishment of such a common world-wide system,” and it proposed a study in order to reach that goal. (UN GERSS 1952, 8-9).

The “Group of Experts on Road Signs and Signals” (GERSS) was established under the auspices of the Transportation and Communication Commission of the

Economic and Social Council (ECOSOC) of the UN in 1950 (UN 1952 GERSS, 9-12 TISRP). What was the state of road signs throughout the world when GERSS began its work? The 1st ed of this study stated that there were two major systems: European and the American. However, Krampen offers the view there were three: The third was what he termed the “African system” which was substantially based on the Old British System with dual signs. GERSS refers to two systems though references to other versions highlights the dual sign form which supports Krampen though not listed as a third form. (Krampen 1983, 102).

The differences between European and American were most pronounced among traffic signs and less so among traffic signals and traffic markings. In some respects there were more extensive forms of aids than with Protocol. Protocol provided an option in form of a plate beneath the primary sign plate; that option was lacking in the American system (UN 1952 GERSS, 9-12). Presumably that dual sign form is British in origin. Variations in the American system were largely one of language differences among hemispheric nations. No notable points of divergence were found in traffic signal practices between the systems.

3A3 *The Inter-American Manual of Traffic Control Devices*

Early attempts towards establishing a system of traffic control devices in the Western Hemisphere are reviewed in Chapter 1. While renewed concern about the state of traffic control devices was expressed at the 1958 Pan-American Congress (Tegucigalpa, Honduras) the point of real beginnings for a manual did not occur until the 8th Congress of PAHC (Bogota, Colombia) in 1960 (“Project,”

1). A strong expression of the need for a TCD manual was strongly reaffirmed at the Bogota Congress which led to the formation of the Technical Committee on Traffic and Safety (hereafter TCTS) in 1964. At that time the director of ground transport in Venezuela was appointed as president of a TCTS sub-committee which was mandated to compose a manual for TCDs in the hemisphere. The original members of the sub-committee were from Argentina, Brazil, Guatemala, Mexico, Peru, and the US ("Project," 1).

The second meeting of the TCTS met in Mexico City in July of 1966 ("Project," 1 TISRP). At that time the President of the sub-committee formally accepted the project of the manual. In December of that year the same group held its second meeting and reviewed the study of signs then in preparation. This meeting considered and approved the signs of preparation (or warning) and the signs of standardization (or regulatory). In 1967 the sub-committee approved the category of informative signs. At the third meeting of TCTS at Montevideo, Uruguay (in late November, early December of that year) the Manual was approved though with some alterations.

The TCTS held its fourth meeting at the US State Department in Washington, D.C. (July 29-August 3, 1968) (PAHC 1968, *Final Report*, 6). It was noted that Resolution LXII of PAHC had approved the manual in principle (PAHC 1968, *Final Report*). The procedure for preparing the manual included examination of actual procedures of the American nations followed by introduction of ideas of the sub-committee. Materials from GERSS, and non-hemispheric sources were also introduced into the discussions though the process of introducing that information is not clear. The sub-committee focussed on

achievement of uniformity. That uniformity encompassed identical symbols, colors, and sign shapes. Divergencies were accepted in the area of word inscriptions (PAHC 1968, *Final Report*, 9, 13).

The *Inter-American Manual* is a curious publication due to its composite nature. The components of the *Manual* contain elements familiar to both Protocol and to the American system. However, these elements do not manifest into an awkward and ill-fitting juxtaposition. Through the efforts of the sub-committee, as well as those of GERSS, the various parts are brought together in a synthesis resulting in a system superior to more widely-employed approaches to traffic control devices of that time. The document, nonetheless, does retain a distinct flavor of the Western Hemisphere; major sections of the US MUTCD continue to exercise a major influence. It is in the area of road signs that GERSS, MUTCD, and the sub-committee have exemplified, amid the crucible of hemispheric needs, their greatest creativity.

3A4 Code for Traffic Control Devices, ECAFE

In 1964 the Economic Commission for Asia and the Far East (ECAFE; now termed the Economic and Social Commission for Asia and the Pacific (ESCAP) promulgated at Saigon, Vietnam (now Ho Chi Minh City) an extensive code for traffic control devices (UN ECAFE 1964, 5). The provisions of the code are very similar to those of GERSS (UN 1952 GERSS, 35-70). In fact, the wording of ECAFE 1964 is identical to that of GERSS in many instances. In other cases the meaning is the same, or nearly so, though the wording is at variance with that of GERSS. In a number of instances the recommendation of GERSS became a definite part of ECAFE and in a binding

sense. (UN 1952 GERSS 35-70; UN ECAFE 1964, 8-9).

The 1964 Code altered the draft document in some key words thereby turning a working document into a definitive document. For example, the code replaced the word "Convention" with the word "Code" and the word "Contracting" was replaced with "Adopting" in the several places where "Convention" or "Contracting" appear in GERSS (UN 1964 ECAFE, Part 2, Article 2). A provision in ECAFE required the adopting parties to inform ECAFE of signs adopted that are not part of the Code (UN 1964 ECAFE, Article 5). This, or a similar provision, is not found in GERSS because of the difference in the nature of the document. ECAFE follows the shorter form (Warning Signs vs Danger Warning Signs) which, in turn, follows the pattern of IAMM, US MUTCD and Canadian UTCDC instead of the longer form employed in European usage and more general UN terminology.

3A5 Outgrowths of the 1952 Draft Convention

According to TCD literature of the 1960s, several smaller-scale versions of the 1952 Draft Convention can be found in use (Zuniga 1964, 1-14; Usborne 1967, 20-23). Turkey seemingly updated its TCD system "in general conformity" with GERSS (Eliot 1960, 24). Though the 1975 edition of *Trafik Isaretleri Elkitabi* clearly indicates that the Republic of Turkey employs the UN system of 1968 very closely. In fact, the current Turkish system is nearly a mirror-image of 1949 and 1968. If Turkey had somehow employed the 1952 approach, they have entirely dis-established it. The only sign in the Turkish manual which can be found in GERSS is the American system Stop sign. And that sign model was adopted by the European nations including Turkey (UN ECE 1971, 3).

The Republic of Ireland, by contrast, has implemented the system of GERSS (Ireland, 1979). In its current form the Irish system adopts the patterns of UN 1968 for information and regulatory signs but the warning signs are clearly from GERSS and the American system (the diamond-shaped sign is now a recognized alternative in the UN system but its inclusion began with GERSS) (Ireland 1979, 60-61). Ireland is seemingly the only European nation employing what was originally the warning sign system of US MUTCD and American system and became favored by GERSS. Though that system was to become an officially recognized alternative in UN 1968 (UN 1969, CORSS, 109).

The Republics of Central America formulated a TCD system in 1957. This approach was also influenced by GERSS (Zuniga 1964, 1). Admittedly, some of the GERSS components (For example, the octagonal shaped stop sign and the diamond-shaped warning sign) were indigenous to the Americas.

3A6 Changes and Reformulations of Older Systems, 1950-1967

a) Introduction and United Kingdom

The 1950-1967 period witnessed a proliferation of TCD systems. Few of these, if any, were based on new and untried concepts. Most, if not all, adopted and adapted what had gone before. Some attempted to conform to new ideas; ideas that would reappear at UN 1968. The 1952 GERSS effort would underlie some of the interim systems. The older 1949 system continued to influence some new national and regional efforts. Central America, Ireland and

possibly Turkey followed the lead of the 1952 endeavor while Scandinavia and the United Kingdom took up the 1949 Protocol; in the case of Scandinavia a considerable effort was made to incorporate ideas proposed for the UN meeting of 1968 (Zuniga 1969, 32).

T.G. Usborne (UK MOT) noted in an article on the adoption of Protocol that the 1952 attempt "did not become generally acceptable" (Usborne 1967, 20-23 TISRP). While GERSS did not achieve global prominence it influenced several national and regional systems as well as influencing the 1968 Conference. GERSS, however, did not influence Britain. For many years UK followed what may be termed the "Old British System" (which was adopted in various possessions of the British Empire and of Commonwealth nations). Several years before the 1968 Conference was held (though after preliminary preparations had begun), Britain decided to adopt/adapt the 1949 Protocol.

What prompted this change during a time not far removed from a new international conference on traffic control devices? In the weighty words of Usborne the change was made because "the rising tide of international tourism in Europe ... made symbolization of road signs in Britain a practical necessity." A committee headed by a Lord Worboys (and thereby known as the Worboys Committee) studied and prepared a complete study in the brief time of fifteen months. The report favored adoption of the Protocol though alterations on points of detail were recommended. Usborne looked beyond the British experience and saw the need for the 1968 UN Conference. He perceived the opportunity, as did others, to establish the basis of a truly international system of signs. But that was not to happen. (Usborne 1967, 20-22).

b) Scandinavia

In 1960 the Nordic Council (which seemingly did not then include Iceland) formulated a Nordic Road Committee that was given the mandate to establish a "proposal for a common Nordic traffic code" (Grotterod and Liavaag 1967, 49). The resulting draft was to be a first phase of a project that would eventually include more detailed signs for each member nation and promulgated by those nations (G & L 1967, 49).

The Nordic nations were also involved in a European project to revise UN Protocol of 1949. A working group termed Group Restraint #3 (CEMT GR. 3) was responsible for that revision; the Group was affiliated with Council of European Minister of Transport (G & L 1967, 49; ECMT 1971). The work of the Europeans would retain its value since the Economic Council of Europe was heavily involved in the preliminaries of the 1968 UN Conference (UN 1967 DCRSS, 1). The work of the Nordic nations on signs in the early and middle 1960s bears a very strong resemblance to current sign standards and practices. The focus of attention of coverage of signs and other aids for Scandinavia will be that of Norway. Presumably the Norwegian manual and practices are representative of the larger Nordic effort (G & L 1967, 50).

c) Canadian Traffic Control Devices

The present Canadian traffic control devices system dates back to 1956 though some antecedents go back a decade or more before that. Beginning in about 1950 there was a growing realization in Canada that the nation needed to provide a system of uniform TCDs for the motorist (Finnbogason 1963, 24 TISRP). An early step toward this

goal was undertaken by a meeting of the Institute of Traffic Engineers. Up to that time there were at least five approaches to TCDs in Canada: British Columbia provincial government published its own manual; Alberta, Saskatchewan and Manitoba relied heavily on the US MUTCD; Ontario promulgated a provincial manual; Quebec “followed a system of standards adapted to its own special requirements,” and Nova Scotia published a manual with the US MUTCD as its basis. While it is true that not all features of the various manuals and systems were contradictory, nonetheless, there were basic differences on sign shapes, colors, and sizes. Finnbogason noted that the intended Canadian manual would lack legal standing. It was hoped that approval could be gained through the provincial legislatures.

Further steps toward the hoped-for manual were taken by a meeting of a Preparatory Committee at Ottawa in 1956, and a Joint Committee was formed in Winnipeg in 1957 (Finnbogason 1963, 24-25 TISRP). The latter Committee contained subcommittees on signs, signals and pavement markings. Traffic control device ideas of the US, Europe, other nations as well as those of Canada were all examined. An early decision was reached in order to create messages that would be quickly understood, and to respond to bilingualism. It was obvious that graphic symbols would create differences with US practice. It was noted that graphic symbols would, in all likelihood, become common in the US as well. The edition of the Canadian manual was published in 1960.

d) The United States

The US MUTCD edition of 1948 was published before the UN Protocol of 1949, as well as before UN Draft

Convention (GERSS) of 1952. Therefore, US TCD efforts were untouched by first global efforts at a common TCD system. The edition of 1961, however, follows after the 1949 and 1952 endeavors. It may be assumed that traces of influence of the early world-wide efforts can be seen in 1961 edition of MUTCD. Word messages dominate 1961 edition nearly as much as in 1948. Graphic symbols were rare even by 1961. Changes were evident in 1961 yet not to the extent that change would be in later editions.

e) The Threshold of 1968: Divergence and Unity

The attempts at building an international signage system in 1949 and again in 1952 were not entirely successful. The 1949 Conference centered, as had earlier European efforts, on the sign experience of Europe even though the meeting included participants from many parts of the world. This resulted in the Conference conclusions being acceptable only to those employing the sign patterns undergirding Protocol. Instead of greater unity UN 1949 Protocol was a factor in further splintering and polarizing world-wide sign practices especially in regard to warning signs and to the stop sign.

The 1952 Draft Convention of GERSS avoided the pitfalls of 1949. But this well-thought out and expertly researched system was never presented at an international conference, though the document was open for signatures. In the view of some, the refusal of the US to sign the document resulted in the failure of the GERSS efforts. However, provisions of GERSS were borrowed, adapted, and adopted by a variety of national and regional groups. This, in itself, created both an increase in uniformity and an increase in the already fragmented state of signs throughout the nations.

3B Traffic Signals

3B1 Introduction and Traffic Signals before 1968

a) Introduction

To sum up, the decade of the 1960s was a time of wide spread fragmentation: systems and parts of systems and amalgamated systems were both dropped and adopted in many parts of the world. Two features of the 1950s and 1960s would be found present in the UN 1968 Conference: the European or Protocol system, and the American system. They would both prove to be too strong and too entrenched for either of the opposing systems to “knock out” or eliminate the other. The two approaches can probably be seen as permanent features of the traffic control devices landscape. An additional continuing feature is that of the regional systems. In sub-Saharan Africa, Scandinavia, Central America, Latin America, Asia and the Pacific, regional systems have been agreed upon by groups of related nations. In 1968 it would become, seemingly, apparent that efforts toward uniformity on a regional, cultural, or continental basis offered the best possibility for trans-national signage. It is also true that the 1968 UN Conference, by offering options and alternatives, somewhat blurred the distinctiveness of the regional efforts but, nonetheless, it would also appear that the regional efforts would continue.

Not only in 1968 but to the present time, the concern for unity has continued. Even though the concern has not resulted in a complete solution to the problem there have been partial answers on a global-scale and perhaps more effectively, on a regional level.

Traffic Signals in the 1st edition were scattered over several chapters since that 1st ed was based on historical chronology and developments of systems. Weaving the disparate elements together with selective enlargement of some topics into a unity can be an uncertain task. Signals, unlike traffic signs, is an often small -- even miniscule -- topic and sometimes a non-existence element in older TCD systems. This is especially true with developments in the 1920s and the 1930s. This coverage is complicated by the presence in some form of signals that are outside of international agreements even though some usage of signals are in use.

This sub-chapter takes up signals, both types and messages from 1952 to 1967. This includes events with Protocol and CASATC agreements. Signal development in the US are included. Available information on signal usage of a more restricted basis from Britain, Germany, Japan is also included. Historical development of signal developments is taken up in Part J. The focus here is on signals as they were employed in conjunction with accompanying messages. The coverage of the earlier 1960s include GERSS and ECAFE with their more developed signal systems. The focus in the later years of the 1960s will be UN 1968 both in types and messages. Developments in Europe and the Americas follow upon that conference.

Traffic signals are largely a visual phenomena but a sound dimension can be present. That sound feature largely relates to railway level/ grade crossings. But it also includes emergency signals and on occasion pedestrian signals. *T-M*

History and the T-M Database: TCD in this Series provide further information on Traffic Signals of various kinds as well terminology. Some additional remarks here are substantially from the *Database*.

b) Terms

TCD systems have long given detailed attention to Traffic Signs. Details on shapes, colors, graphic and other symbols, purpose are found even in early systems of a simple nature. While Traffic Signals have received less attention even in some relatively new systems. Admitted Traffic Signals have a limited range of messages which requires less quantitative attention than that of signs. This is especially the case in European systems which give less coverage, include fewer forms and often lump diverse forms under a few headings.

UN Protocol 1949 does not include Pedestrian Signals and subsumes Level Crossing Signal under a broader category. UN GERSS 1952 omits Pedestrian Signals, refers somewhat indirectly to Level Crossing Signals and has the single term of Traffic Signals for the entire category of lighted signals. In other nations, including Japan and many nations of the Western Hemisphere the coverage is more substantial. Various forms of signals are given names of their own and more forms of signals are available. Traffic Signals have a larger place in TCD forms and usage.

UN 1968 employs Signals for Vehicular Traffic as its primary term. A seemingly specialized term, Highway Traffic Signals, has had primary importance for that form of signal in the US. It includes nearly all forms save lighted signs and barricades. Road Signals is included in the title of the UN 1949 efforts. Yet the term is not employed in the

document. Traffic Light Signals is the primary term for UN GERSS 1952, ECAFE 1964 and also UN Protocol 1949. It has more of an international cast than Traffic Control Signals though there is no specific usage in the Western Hemisphere. Traffic Signals -- the primary term for this study -- has a somewhat restricted usage. Canada 1976, IMSA 1981 and several individual authors employ the term but there seems little use beyond that. US MUTCD places the terms within () after Traffic Control Signals. The term Traffic Control Signal has more specialized use in many Western Hemisphere nations. It refers to stop-and-go operations at intersections and is not an overarching term. Traffic Signal is perhaps a compromise term that includes parts of terms employed in many systems. It also parallels basic terms for other kinds of TCD forms: Traffic Signs and Traffic Markings.

Subdivision terms refer to pedestrian signals, flashing or traffic beacons, level/grade crossings, lighted devices. These are reviewed in the Database (TCD 1998).

c) Traffic Signals, 1952-1967

UN Protocol 1949 provisions formed the foundations for the GERSS approach to traffic signal guidelines (UN 1952 GERSS, 27-28 TISRP). GERSS deliberations took note of several points of controversy including the use of flashing amber lights and the use of flashing red signals, differentiation of flashing red signals at intersections and at railway level/ grade crossings.

Non-flashing traffic signals follow what has become the commonly accepted definitions (UN 1952 GERSS, 62-65 TISRP). Flashing signals, if amber in color, emit the messages of "proceed with caution" and flashing red

indicates “stop, then proceed with caution.” This latter signal was vetoed by the UN 1968 Conference. GERSS provides for a vertical arrangement of signals: red at top, amber in middle, and green at the bottom. GERSS includes heights for mounting of signals. Finally, the Group of Experts posits a recommended color for the signal housing: black, “or a dark neutral colour.”

There is a high level of agreement between GERSS and ECAFE in the area of traffic signals (UN 1952, GERSS, 62-65; UN ECAFE 1964, 14-15 TISRP). One exception to this unanimity is the allowance of two-color traffic signals by ECAFE. This two-color approach allows for a green-red combination as a substitute for the amber or yellow color in a three-color system. The recommendation of GERSS on signal casings (or housings) is also found in ECAFE. That recommendation further suggests casings should be of a dark color.

Further changes took place in the 1961 edition of US MUTCD. Pedestrian signals were all to be rectangular in shape; older circular forms were no longer standard (Hawkins 11-92, 19). The word “wait” could no longer be employed since it might be confused with the word “walk” at a distance. Colors for walk were to be green or white. Don’t walk colors were to be orange or red. Twelve-inch signal lens were included in the 1961 edition. Lane-direction control signals were to display a standard design of green arrow (downward) and red “X”.

3B2 Traffic Signals: 1968 and After

a) Documents Preceding UN 1968

A primary focus for traffic signal work is the UN

Conference on Road Traffic in 1968. It remains a benchmark even if not all global signal issues were resolved down to the present. The final document promulgated in 1969 is only of several documents that pertains to how traffic signals have developed. A pre-conference publication in 1965, a draft in 1967 as well as a variety of working papers at the Conference need to be included.

Provisions of 1965 and 1967 include discussions of the use of amber and positioning of signal heads. These are topics also included in Protocol 1949. The 1965 draft included a provision for an alternative form of traffic signal in which shape joined color in creating messages. Red was to be circular, yellow a triangle and green a square. The 1967 draft deleted that idea. Shape is a vital element in many safety aids and it might have had significance in signals if a horizontal configuration was followed. (UN 1967 DCRSS-NSG .56/3, 17 and .56/4, 7).

The 1967 proposed a “dark arrow” to be superimposed for red and amber lenses. That proposal did not survive the next round of work. The introduction of red “x”s and green arrows over driving lanes was incorporated into the 1968 work and subsequently became a frequently employed aid. (UN 1967 DCRSS-NSG .56/3, 17 and .56/4, 7).

A point of controversy that was never resolved centered on a single red light in flashing mode. The 1965 draft included it as did GERSS (UN 1952 GERSS, 62-65). But the 1967 and final draft would not accept the idea. The single flashing red light is employed in Japan, and many nations of the Western Hemisphere. And that usage has continued. A publication entitled *Proposals, Suggestions, and Observations* included a request from Japan to approve

that flashing beacon at intersections. But to no avail. (UN 1968, PSOC-DCRSS, Ad. 1 TISRP).

Pedestrian signals were to include graphic representations in the 1965 draft. But the next draft referred to such graphic symbols as to be preferred but it was not mandatory. And two-colors pedestrian signals in 1965 became either two or three colors in 1967. (UN 1967 DCRSS-NSG .56/4, 7-8).

The 1965 draft required two red flashing lights together. This refers to non-intersection usage. But the newer and also the final draft permitted either one or two lights. This has an impact on flashing red lights at intersections. One flashing red light at a railway crossing can suggest the meaning of one flashing light at an intersection for those nations with flashing red beacons. (UN 1967 DCRSS-NSG E/Conf. 56/4, 7).

Lunar white lights are allowed in some nations at railway crossings. In the old draft any nations using such lights were to make a declaration to that effect. But the new draft speaks of lunar lights as coming under the category of “domestic legislation.” The 1967 includes signals for cyclists and that provision takes on official status in the final draft. The 1967 draft also requires that pedestrian signals “be so designed and arranged” they cannot be confused with motor vehicle signals. (UN 1967 DCRSS, 19; UN 1969, CORSS, 94 TISRP).

b) 1968 UN Conference: Traffic Signal Messages

The UN Conference papers consider signal message indications under two headings: “Signals for vehicular traffic,” and “Pedestrian signals” (UN 1968, CORSS, 92,

94 TISRP). Traffic signals include one of two types of signals in the general signal category of the classification (411), and all of the signals in the special signal category (412). Non- flashing lights are in three colors: green, red, and amber. Green indicates proceed. Red indicates Do Not Proceed (that is, beyond a stop line if present, or into the intersection beyond the signal where no stop line is present). Amber indicates that a red signal is so close to occurring that a vehicle can not safely enter the intersection (unless it would be unsafe to stop).

Flashing lights have reference to one or other type of special traffic signals with the possible exception of some pedestrian signals (UN 1968 CORSS, 92, 94, TISRP). Red flashing lights indicate that vehicles are not to proceed (according to the UN but not according to the practice of a variety of nations). The UN notes that flashing red lights are found at railway level/grade crossings, movable bridges, ferry-boat landings, fire-fighting equipment in motion, or low flying aircraft. No mention of a flashing signal at intersections is included even though such signals are in use by some signatories of the Convention (for example, Japan, the US). Flashing amber indicates that “the drivers may proceed but shall do so with particular care.” This definition does not appear to preclude amber flashing traffic beacons.

The UN Conference speaks of three-color light systems and two-color light systems: three-light systems include the colors red, amber, and green, while the two-lights types includes only green and red (UN 1969, CORSS, 93-94 TISRP). The two-color types are non-flashing signals and are for temporary use only. One might consider a traffic beacon with red in some directions and with amber in other directions to be an acceptable kind of

two-color signal systems, but this form of traffic beacon has been disallowed by the UN. The arrangement of signal lights can be either horizontal or vertical. Red occupies the top position in vertical arrangements, with amber in the middle, and green at the bottom. In a horizontal pattern the red is to be “placed on the side opposite to that appropriate to the direction of traffic.” Lights are to be circular in all cases.”

The color amber can constitute a signal in itself, and it can substitute for a three-color signal during times of reduced traffic (UN 1969, CORSS, 93-94 TISRP). Green arrows indicate specific directions (s) to which traffic may proceed. Red lights containing crossed bars indicate proceed. Railroad crossings are allowed to display “a slow-flashing white light meaning that traffic may proceed.” Special cycle signals incorporate a representation of a cycle on the signal face, or a sign depicting a cyclist accompanying a standard signal. Pedestrian signals follow the standard norms regarding non-flashing lights and flashing lights. In these instances the two-color system of lights is preferred. Special symbols of varying forms are not included though seemingly commonplace for some of the Convention signatories; for example, the UK and the US.

c) Changes After 1968: Europe and North America

Three publications in Europe (1971-1977) explain changes in UN 1968 for Europe as well as general principles in use. These provisions include rules that require main signal lights to be of the three-color system either vertical or horizontal. The lenses are to be circular in shape and 200mm with larger lens in specific cases. Pedestrian signals display graphics of human representation with a

figure in red for standing, and green for walking. These signals are to be rectangular in shape. Three-color pedestrian signals are not employed in Europe.

European usage preferred two red flashing lights at level crossing in cases where a gate or half-gate was employed. Three-color signals could be use at crossings as a supplement but the flashing red signals were to be present. Other provisions included the requirement that an arrow in red or yellow denoted only the direction indicated by the arrow. And amber signal (non-flashing) followed by a red signal (also non-flashing) could be employed in less travelled situations.

A comparison of the 1971 US MUTCD with UN 1968 reveals changes in MUTCD influenced by UN. It also illuminates continuing differences. The 1st ed of Part E employed 1971 rather than 1978 since it better reflected US policies, practices in the immediate post-UN era. Flashing beacons at intersections have been a mainstay in the US for decades and the 1971 edition continues that tradition. US, Japan, others nations including in the Western Hemisphere ignored the stipulation against such beacons.

The UN and the US are also in disagreement over the messages for pedestrian signals. The UN permits three-color signals for pedestrians but 1971 MUTCD does not allow that practice. The UN approved the usage of an amber light to indicate, “... the green is about to end and the red light [is about to] come on.” For the US a flashing red DON'T WALK signal conveys the meaning the UN ascribes to green. For the US a flashing symbol, in green, indicates “possible pedestrian conflict with vehicles.” An alternative color format was proposed for pedestrian signals but this was dropped. That change would have allowed red/

green signals as well as lunar white and Portland orange signal colors.

The 1971 MUTCD makes considerable use of arrows. In this edition green arrows are used to “indicate a protected movement”. Yellow arrows “may be used to indicate a clearance interval following a green arrow in displays for specific turn lanes.” Flashing arrows were eliminated from the first draft of MUTCD, though red and amber arrows are included. However, only green arrows are permitted in UN 1969 CORSS (Fowler 1970, 27; Shoaf 1971, 62). Hawkins notes the adding of “X” in a flashing mode for lane-control signals (Hawkins 1992, 20).

Changes in 1978 include adding a graphic symbol for pedestrian signals (as well as word symbols). Flashing signal for pedestrians (Walk) was dropped. Information on ramp-control signals was also included. In 1988 a yellow arrow was added. It was employed “for clearing a green arrow.” (Hawkins 1992, 21, 22).

CHAPTER FOUR

WARNING SIGNS & INFORMATIVE SIGNS

4A 1952-1968

4A1 Introduction

All forms of traffic control devices were subsumed under history, chronology and systems in the 1st ed of Part E. This edition places TCD forms on a more immediate level. Signs represent many and diverse forms so that a single chapter could not contain all sign forms without becoming very bloated. Since signs represent an organic reality the subdividing of signs into chapters could easily become arbitrary and artificial. The core idea of signs as interrelated and integrated must be kept in mind even as signs are placed in separate units.

Signs, along with signals and road markings are considered together in the years up to 1950 in Chapter 1. That chapter follows a history and systems approach. Warning Signs and Informative Signs are examined together in this chapter. Since Regulatory Signs have a more complex - and lengthy - development they are considered separately in Chapter 5. Chapter 4A2 reviews the more modern era beginning with UN GERSS 1952. ECAFE and IAMM, along with changes in older systems, complete 4A2. 4A3 reviews warning signs for UN 1968. Chapter 4A4 examines changes in warning signs since 1968 with emphasis on Europe, and the Americas.

Signs of warning have had at least three major names: Danger signs in Europe to and including UN Protocol 1949 (80); CASATC also employs that term (1950, 77). Danger

Warning Signs was preferred by UN GERSS 1952 (2) and UN 1968 (iv). Warning Signs was employed by IAMM (1967, 22), and the US (1961, 53). It was also used by ECAFE (1964, 8) which largely followed the practices of UN GERSS. Some past UK publications also employed warning for these signs. IAMM, which employed warning signs in the body of the first edition, employs a different term under “general specifications”. In that context it refers to Prevention Signs. Seemingly, no other source employs that term (IAMM 1967, 3).

4A2 1952-1967

The Draft Convention of GERSS offered a more global perspective on traffic control devices than UN Protocol 1949 including the topic of warning signs. GERSS recommended three possible shapes for warning signs which reflects this broader view. These shapes include: equilateral triangle (single point upwards), diamond (square with “one point diagonal vertical”), or equilateral triangle above rectangle or diamond (UN 1952, GERSS, 39-52 TISRP). The color of the danger warning sign, without regard to shape, is to display a yellow ground, black symbols and border (or “a similar dark color”). The three shapes were for transitional purposes only since the preferred shape was to be the diamond. The Draft Convention is a precise document and provides dimensions for sign sizes, distances from sign to object that the sign serves as a referent, and height of the sign. Illustrations are largely graphic in nature and illustrated in the Draft.

The ECAFE (Economic Commission for Asia and the Far East) Code is very similar to GERSS. Frequently the recommendation of GERSS became part of ECAFE and in a binding sense. For example, in a variety of places in the

document the words “Convention” and “Contracting” become “Adopting” in ECAFE. In the important area of warning signs the three-choice option of shape and color is closely followed by ECAFE and this is also true of the GERSS recommendation for diamond-shaped signs, and signs with a yellow ground (UN ECAFE 1964, 8-9).

There are also points of difference to be noted between GERSS and ECAFE in regard to warning signs. A major change from GERSS is to be found in the color format of warning signs. ECAFE required a red border (without regard to the shape of the sign that is employed) (UN ECAFE 1964, 8). The red border addition was tested in the GERSS project and it did not add any positive results. In fact, test results indicate it “did not increase legibility” of the sign (UN GERSS 1952, 19). Other differences between GERSS and ECAFE included a variant design of a level-crossing unguarded in ECAFE. ECAFE also added a “Road Diversion” (detour) sign, and a “Rule of the Road” sign (the latter sign has, in turn variant forms) (UN ECAFE 1964, 26).

IAMM (*Inter-American Manual of Traffic Control Devices*) was promulgated in 1968. In the area of warning signs there is a convergence between US MUTCD and IAMM (IAMM 1967, 2-4). The distinctive diamond shape with a yellow ground and black symbol is found in both manuals; this parallels GERSS. However, there is divergence to be found between MUTCD and IAMM. Warning signs from US MUTCD are replaced with graphic symbols in IAMM. Zuniga notes that the IAMM system of sign has much in common with the 1952 Draft Convention. (Zuniga 1969, 2). Gradually the US MUTCD would move to much more extensive use of graphic symbols though not by 1971 when the next edition of MUTCD was published.

Changes in other systems from 1952 to 1967 include some alterations to warning signs. Usborne in discussing the United Kingdom move from Old British System to UN Protocol 1949 makes references to GERSS and the characteristics of the diamond-shaped signs (Usborne 1967, 20). Specifically he refers to the increased sign surface with diamond-shaped warning signs (“square standing on one point”) (Usborne 1967, 20). Yet Britain adopted the Protocol system in its entirety. Ireland, by contrast, adopted GERSS including the diamond-shaped signs (Ireland 1979). Turkey and Egypt were influenced by the work of UN GERSS in their TCD systems (Eliot 1960, 24). A new TCD code of Central American republics was in accordance with GERSS (Zuniga 1964, 1). Of course GERSS, as previously noted, included the warning sign shapes and colors of the American system coupled with UN 1949.

Extensive work in Scandinavia on traffic control devices was to have an impact on UN 1968. However, that work was in the European mode and warning signs (danger signs in Scandinavian parlance) followed the forms familiar in UN 1949 Protocol (G & L 1967, 50).

The US warning sign system underwent some changes from 1948 to 1961 MUTCD. New warning signs were added that included “Yield Ahead”, “Merging Traffic” and “Pavement-width” signs. Some warning signs were moved into a special construction sign category. However, the dominance of word messages continued with few graphic symbols in use (US MUTCD 1961, Part I-C).

4A3 UN 1968 Danger Warning Signs

The UN 1968 Conference made notable progress toward a global sign system. The European focus of UN 1949 was less a factor. And the more international focus of UN GERSS 1952 was apparent. UN 1968 did not favor the American system for warning signs (shapes and colors) but it did include that system and the advantages of that approach. A review of the work of UN 1968 is required to gain an understanding how that system came about.

Article 9 in the 1967 draft approaches an official status of two models of danger warning signs (UN 1967, DCRSS, 3-4 TISRP). The draft called for a “reservation for adoption of the diamond” though no illustrations of it was provided. The new draft allows for a choice of either sign “giving slight preference to the triangle,” and requiring users of the diamond to “make a declaration to that effect.” This article in the newer draft requires placement of danger warning signs on especially dangerous parts of roads; the E/3999 draft (1965) spoke of placement when it was thought necessary.

Article 10 gives two models of the stop sign: “the 1949 Protocol sign and the red octagon surrounding the symbol ‘Stop’” (UN 1967, DCRSS, 5 TISRP). The new draft allows both the 1949 and the octagon, “both with the symbol ‘STOP’.” The 1949 Protocol sign is given preference which was also the case with the danger warning sign. Article 10 also permits the “STOP” sign for use at level [railway] crossings. Article 12 in the new draft allows for a “black arrow on a white ground with a black border” even if some other mandatory sign is present.

The *Proposal, Suggestions and Observations* document includes observations and concerns of the participants. Australia asked for exclusive use of the

American danger warning sign, and Rumania echoed other nations and requested exclusive usage of the triangular model for danger warning signs (UN 1968 PSOC-DCRSS, Annex 1-2).

The two forms of warning signs included by UN 1968 can be termed the European system model and the American system model. The first is the equilateral triangle with a ground of white or yellow, and a red border. The second is of diamond shape (or “square with one diamond vertical”) (UN 1969, CORSS, 109). This second form has a yellow ground with a narrow border (“rim”) in black (US MUTCD, I-C). The inclusion of both models is an indication that the Convention recognized the significance of more than one model of the sign. Both models come in two sizes: two-feet across and three-feet across for the equilateral triangle, and one-foot and four inches across and two feet across for the diamond (UN 1969, CORSS, 112).

UN 1969 divided the category of warning signs into three segments: a) Warning Signs “other than those placed at approaches to intersections or level-crossings”; b) Intersection Signs (a segment which included regulatory signs at intersections); c) Level [grade] Crossing Signs (UN 1969 CORSS, 109-114). However, UN GERSS and most other systems regard warning signs as one category and they are so treated here.

UN sign types are grouped within the classification categories of this study. Signs within Roadway Alignments and Conditions include a diverse collection. It includes dangerous bends to the left, right, and double (or more) bends. Dangerous descent/steep ascent signs come in two forms depending on whether the triangular sign or the diamond-shaped sign is employed. This category also

includes carriage-way (or highway) narrows signs that can exhibit a more general purpose symbol that denotes either a narrow road ahead, or a more precise symbol that indicates parts of an upcoming road that narrows. Swing bridge/quay/riverbank road signs have appropriate visual symbols to represent those special conditions. Dips, humps, ridges, and areas of loose gravel signs illustrate appropriate graphic symbols. Falling rock signs are of two variants because of the differing shape of warning signs (UN CORSS 1969, 109-110).

A second category of warning signs is that of intermittent moving hazards. These signs include two forms of a pedestrian crossing sign, one form of a children crossing sign, one form of a cyclist sign, and two forms of animal crossing signs (one for domestic animals and one for wild animals) (UN CORSS 1969, 110-111).

Warning signs for intersections is a third category. Symbols for these signs are in black or dark blue (UN CORSS 1969, 112 TISRP). The signs for these purposes are subdivided according to the rules or priority. If it is an “intersection where the priority is that prescribed by the general priority rules ... in the country” then the general purpose signs will be employed. These consist of a “X” for the triangular warning sign, and a cross-shaped sign for the diamond-shaped sign. Yet more precise forms are available that replicate with more detail the patterns of upcoming intersections; for example, a “Y” shaped or a “T”-shaped symbol represent intersections of those shapes. Signage is also provided for those instances in which a motorist must give precedence to higher priority flows of traffic; the sign in this instance is an arrow with a “fish-tail” and a cross bar bisecting the arrow.

The basic sign for level/grade crossings displays an illustration of a gate for those crossings with gates; for gateless crossings there are choices between a visual representation of a locomotive, or an "X" with a section of track superimposed on it (UN 1969, CORSS, 114-115 TISRP). A tramway car representation denotes tramways. A second phase of railway crossing safety protection includes those signs designed "to be placed in the immediate vicinity of level crossings." These include an elongated "X" with "a white or yellow ground and a black or red border," and a half "X" added to a full "X" to indicate two tracks. A third version adds a word inscription in black letters. An additional panel, when added to the final version, can indicate the number of tracks. The "X"s are to be at least four feet in length.

An additional aid to safety at crossings consists of rectangular panels displaying oblique red bars on a yellow or white ground. Additional panels can be required at specified intervals between track and railway signage (UN 1969, CORSS, 99-100 TIRSRP). Railway gates themselves are to be marked with alternating red/white, red/yellow, black/white stripes. Solid white or yellow stripes are permitted when accompanied by a red disc centrally displayed.

The main portion of the UN treatment of warning signs concludes with a review of marking "Other Dangers" (UN 1969, CORSS, 112). Dangers not explicitly described in the UN documentation are marked by a "!" point. Signatories of the Convention may add other symbols for this type of danger in accord with the same Convention. The 1st edition of Part E had two Other Danger groups. The first referred to the UN term and meaning. The second included a group of signs of disparate signs that would have



been difficult to classify in a coherent pattern. These included low-flying aircraft, cross-wind and two-way traffic signs. However, the 2nd ed has one such category since some members of those former categories are now assigned to the Variant Classification thereby reducing the need for some of the complex categories in the 1st ed.

4A4 Regional and National Changes & Implementation

Various implementations of national and regional systems took place after the completion of UN 1968. A disproportionate portion of a review of these events centers on Europe, and the Americas. Both regions had large, long-established and complex systems of traffic control devices in place. Not surprisingly changes and alterations in those systems in response to UN 1968 were needed.

The European nations selected danger warning sign "Model Aa (UN ECE EASCRSS 1971, 3-4; ECMT 1972, ERCRTSS, 59-61 TISRP). That model is the European-originated triangular sign (with point up) that had been in use throughout most of the century. While the Europeans would go on to select the American model of the Stop sign they would otherwise would follow the historic patterns of the region. The Advance Warning sign for danger warning (model B 1) for Europe consists of a sign identical to the warning sign augmented by a "Model 1" of the Additional Panels segment of the UN Conference. Advance warning signs for the stop sign consist of a B 1 sign supplemented by a panel exhibiting the "stop" symbol and the distance to the B, 2a sign in question.

A comparison of the 1971 US MUTCD with UN 1968 will reveal changes in MUTCD influenced by the UN conference. It will also illuminate continuing differences

with UN 1968. What has been termed the “American system” underwent substantial change outside of the US before 1968. GERSS and/or Protocol influence brought about major use of graphic symbols in Central America, Canada, and Latin America.

A variety of 1971 Warning signs exhibit a dual character: a new graphic symbol form, and a traditional word-only message form. The graphic form stems from UN and other international conferences while the traditional word message emanates from 1961 MUTCD and even before that edition (US MUTCD 1971, Part II C). The 1971 edition expands the section of crossing forms. The expanded signs give primary attention to the referent of the sign: cattle, pedestrians, etc. through the use of graphic symbols. A smaller plate on these signs give the older word messages (US MUTCD 1971, 79). New warning signs are added to the earlier edition. These include “Exit” and “Ramp” Speed Limit signs and a “No Passing Zone” sign of a new and distinct shape: a “penant shape in the form of an isosceles triangle with the longest directional horizontal” (US MUTCD 1971, 82-83, 15).

Construction and maintenance signs became orange on black in 1971 (Hawkins 11-1992, 20-21). In more recent editions changes have been more incremental with limited changes though changes in organization of sign groups and functions were made. For example, railroad crossing and school TCD materials became units of US MUTCD in their own right instead of scattered through the publication (Hawkins 11-1992, 21). Changes continued though the basics of warning signs in color, shape, and substantial commitment to graphic symbols continued.

IAMM 1967 displayed marked resemblance to US

MUTCD. The 1981 edition was a Mexican production with different configuration and inclusion of national materials for a variety of hemisphere nations. Warning signs continued on largely unchanged since the earlier edition. A commitment to graphic symbols was already firmly in place in that earlier edition. (RDMCS 1981, SDP, Hoja 1, 1-25).

Europe through ECE followed UN 1968 closely in most respects. However, Amendment 1 to the Convention of 1995 indicates some changes from UN 1968. Both warning signs for intersections and level [grade] crossing signs are integrated into the general warning signs coverage. Signs are included for roundabouts, dangerous shoulders, traffic congestion signs that do not appear in the UN Convention (UN ECE 1995).

No new edition of ECAFE has been promulgated though ECAFE influence has continued to some degree. Asian nations that follow the ECAFE pattern includes Indonesia which maintains a bifurcated system of Protocol informative and regulatory signs with the American warning system pattern. This reflects 1952 GERSS and 1964 ECAFE sign patterns (Indonesia 1986).

4B Informative Signs

4B1 Introduction

This category of signs has had multiple names over the past century and in many systems. The three UN TCD endeavors employ informative signs (though UN 1968 excerpts standing and parking signs from the category). ECAFE 1964 (11) and CASATC 1952 (61) also include the term. US and IAMM (in English) follow an alternate term: Guide Signs. The Spanish edition of IAMM (1981, 1) utilizes Informacion. Canada uses information with guide signs as a sub-component (1976, A4.01).

A third term is that of indication signs. LN 1931 made use of Signs Giving Indications Only (7) while LN 1939 has Caution or Indications Signs (the two sub-categories when together represent the spectrum of signs for those functions) (CCT/CDR/4, 8-38, Table V.). Some authors in the literature (Eliot 1960, 21; Sessions 1971, 83) have used informational signs which presumably has the same meaning.

Older informative signs, as was the case with warning and regulatory signs, are considered in the first chapter for events beginning from 1950 to the early 20th century. The first event is that of UN GERSS 1952. The second UN 1968 conference represents the pivotal effort at traffic control devices for international cooperation. ECAFE, IAMM, US as well as work in a variety of nations and regions mark the post-1950 era.

4B2 Informative Signs, 1952-1967

GERSS informative signs were sub-divided into four

segments: Advance direction signs, direction signs, route markers, signs giving general information signs (UN GERSS 1952, 61-62 TISRP). There were two permissible color formats: light ground and dark letters, or dark ground and light letters. The color yellow was not to be used on these signs. The Convention recommended a white ground and black letters for informative signs. Advance direction signs were rectangular in form. Direction signs were rectangular with the long side horizontal and displaying an arrow. A second form of direction sign is of similar shape but with one end of the sign in the shape of an arrow. Route Markers were to be rectangular with numbers of letters or letters/numbers combination. Signs giving general information are of rectangular shape and with a color format identical with that of directional signs. ECAFE 1964, 13 TIRSP) informative signs are virtually identical to GERSS signs. ECAFE implemented the GERSS recommendation on color format for this category of signs: white ground and black letters.

US MUTCD 1961 guide signs was augmented by the addition of such signs for freeways, expressways. These signs employed white symbols on green ground. The signs used lower case letters and were of larger size and higher in elevation than previous signs (Hawkins 1992, 19). IAMM 1967 reflects the classification of signs from US MUTCD. However, IAMM uses UN style of signs for the information sub-category of signs. The mountain road-closed and -open sign system of the UN is included, and for that matter reprinted, in IAMM (IAMM 1967, 50-51; UN 1969 CORSS, 122, 167).

Ireland employed UN signs other than for warning signs (Ireland 1979, 60-61 TISRP). Ireland made one change from GERSS in the area of direction signs. The

older signs displayed a white ground with black symbols and border; the newer signs exhibit the green ground with white symbols and borders; this new format is finding increasing use both in Europe and in areas well removed from Europe.

Central America assembled a code for traffic control devices in 1957 which was heavily influenced by GERSS (Zuniga 1964, 1). Scandinavia work in change for signs included direction and designation signs. They made the decision to use yellow on a wide basis for many of these signs from small direction signs to large diagrammatic signs. (G & L 1967, 50-51, Norway 1980, FOOT, Kap. VIII). Since some forms of Nordic direction signs employ curve and arrow symbols it would appear that there is a possibility of confusion for those nations using a yellow ground for warning signs. This includes Ireland in Europe.

4B3 UN 1968 and Informative Signs

a) Changes in Drafts

A variety of changes took place between the first 1965 (E/3999) and the intermediate draft (E/Conf.56/3) draft in 1967. These changes included technical and specialized changes as well as more basic changes. Technical changes included placement of names on direction signs and spacing of place names.

A review of UN 1967 DCRSS (14-15 TISRP) and the final draft UN 1969 CORSS (89-92) uncovers changes both large and small. Articles 14 to 21 were formerly known as Informative Signs but these now become Informative Signs Other than Parking Signs. Article 14 includes very limited changes of the existing material, but

the new draft adds three new paragraphs which give details on the usage of road inscriptions. The second paragraph of Article 15, on the placement of distance figures and the third paragraph of the older draft, on the place of road numbers is deleted.

Article 18, paragraph 2, Place Identification Signs has been altered; the older draft refers to signs for built-up areas without designation numbers while the new draft includes numbers (UN 1967, DCRSS, 14-16; UN 1969 CORSS, 90-91 TISRP). The newer draft includes four variants of sign E, 9 while the older draft had only two. The new draft has added a paragraph that provides for an altered sign for place identification "giving information other than the name of a built-up area. Article 21 contains a new paragraph 2 that allows for informative signs being repeated for a given area (with additional panels for the distance).

The title of Annex 5 in the old draft was Informative Signs Other than Priority and Parking Signs but the new draft omits priority from the title (UN 1967 DCRSS, 1, Annex 5; UN 1969 CORSS, 120). Sign E, 1c, allowing "pre-selection at intersections on roads with several lanes," of Section A is a new sign (UN 1969 CORSS, 120, 162). Sign E, 2c, a form of No Through Road sign is also dropped. (UN 1967, DCRSS, An 5, 2-4: UN CORSS, 120 TISRP). Section B in the new draft both changes and expands design forms of direction signs. Sign E, 6c adds a third form for airport direction signs which is new to the final draft. Section C of Annex 5 expanded the older version of Place Identification signs and a narrative section has been added. The Confirmatory Sign in the new version "may be placed on the reverse side of another sign intended for traffic proceedings in the opposite direction". Section E, Pedestrian Crossing Signs, expands Sign E, 11 into "a" and

“b” forms: one with a pedestrian silhouette and the second an “irregular pentagon” with blue ground and white symbol (UN 1967, DCRSS, 15, An. 5). Section F, Other Signs Providing Useful Information for Drivers of Vehicles,” is marked by a new ordering and a re-arrangement of descriptive material though the meaning appears unchanged (UN 1969 CORSS, 121-122). Two new signs for stop and tramways have been added, however. Sign E, 21 in the new draft was E, 19 in the old draft. And again, light yellow becomes yellow in Section G (UN 1967, DCRSS, 9-10, An. 5; UN 1969, CORSS, 122).

b) Signs in UN 1968

Informative signs are often rectangular in shape. Direction signs are frequently of a distinctly elongated rectangular shape with the predominant dimension horizontal (UN 1969, CORSS, 91, 120-121 TISRP). Symbols for these signs are white or “light-coloured,” with a “dark ground.” The reverse treatment of dark symbols on light ground is permissible. The color red is to be used only in exceptional situations, and it is not to dominate. An examination of the visual representations provided in the UN documentation indicates one example of an Advance Direction sign that is square rather than rectangular in shape. This representation is of a basic sign and not a variant model.

The Destination and Direction signs in the classification (and Database) encompasses the UN signs beginning with Advance Direction signs (UN 1969, CORSS, 120 TISRP). These are installed at some distance from the intersection leading to the intended direction. The sign comes in “general case” and “special case” models. The former give the names of several towns and cities, distances to them,

and possibly, directional arrows. The latter do not give names of towns and cities and distances but instead they give more specialized information including, for example, roads that are not through roads, directions for left-turns and pre-selection of lanes.

Direction signs exhibit distinctly longitudinal rectangular shapes with the name of a single town, and with the distance in miles or kilometers (UN 1969, CORSS, 90, 120, 163 TISRP). The signage color scheme permits white and black, or blue and white, formats. These signs may give the names of several towns, though without distance data. There are several variations of directional signs, including airport, campground, and youth hostel signs. These signs are followed in turn by road identification signs. These signs are included in the “article” section of the UN documentation though they are absent from “annex” and visual sections. The signs for road identification can accomplish this goal by one of several methods: by the use of numbers, of letters, or of their name. This sign consists of the desired symbolic representation within a rectangle or shield-shaped sign.

Place identification signs are rectangular in shape with the horizontal dimension as dominant (UN 1969, CORSS, 90-91, 120 TISRP). The signs consist of a white ground, black rim, and black letters; or a blue ground with white letters and without a rim. They are found at the beginning of a “built-up area.” An identical sign but with a diagonal red bar marks the end of such an area. These signs indicate frontiers between nations, boundaries between subdivisions of one country or scenic area, river or other geographical point or urban area.

Confirmatory signs offer the motorist confirmation of

the direction of a route (UN 1969, CORSS, 91, 121 TISRP). This type of information may be required in a congested area. The sign is rectangular in shape with black rim, white ground, and white letters. Pedestrian signs come in one of two forms: either a rectangle in blue or black containing a white or yellow in blue or black containing a white or yellow triangle and with either a black or dark blue representation imposed on it. The other form is in the form of an "irregular pentagon." This sign projects a blue ground and white symbol.

The first edition of Part E including the classification, listed terms from UN including "Providing Useful Information for Drivers of Vehicles" and "Facilities which may be Useful for Road Users" for categories of signs. The Database and the revised classification encompasses those groups under a different term: Signs of General Information. The term is from UN GERSS 1952 (61) and encompasses a broad spectrum of signs that provide various kinds of information. Signs Giving General Information (SGGI). That will be the primary term for this section of informative signs.

Signs "Providing Useful Information for Drivers of Vehicles" is a catch-all designation for diverse signs united only through the broad theme of providing useful information (UN 1969, CORSS, 121-122 TISRP). Among these signs is the hospital sign which can take one of two forms: a rectangular blue sign with a large white "H" in English or a blue sign with red cross and white hospital bed impressed on the ground color. One-way signs display a markedly horizontal and longitudinal dimension and a horizontal arrow. The arrow is embossed with the message "one-way." The No Through Road sign includes the standard blue ground with white stripes representing the road

accompanied by a red band indicating the road is not a through route. "Motorway" and "End of Motorway" signs denote the beginning and end of a motorway and indicate the commencement and ending of special rules. These signs show a blue ground with dual white stripes that denote the roadway. Horizontal stripes indicate the beginning of special rules and red bands indicates the end of such rules for these forms of signs.

Other signs in this category include the "Road for Motor Vehicles" sign which exhibits a blue ground with a representation of a white auto and denotes that motorway rules are applied to non-motorway roads (UN 1969, CORSS, 121-122 TISRP). An identical sign with the addition of a red band indicates the end of such rules. Two additional signs contain a blue ground with a white rectangular insert and a busy or tramway representation. The last sign in the group is a "Road Open or Closed" sign for mountain roads, especially mountain passes. This sign, a very complex one, has several panels which not only give the name of the road section but also are capable of designating whether the road is open or closed as well as more detailed information including what part of the road that is open or closed, and whether chains or snow tires are necessary. This sign is blue in ground and with letters. It exhibits a red panel if closed, and a green panel if open.

Also included in SGGI signs is the UN group entitled "Facilities which may be Useful for Road Users (UN 1969, CORSS, 122-123 TISRP). This too can be seen as a "catch-all" designation. These signs have a blue or green ground. They include a white square insert on which the sign is displayed. The bottom part of the sign can be established near the object of the sign. These signs can include a white directional arrow. The symbols are black or dark blue

except for certain exceptions which display red symbols. This sub-category includes two segments of the UN documentation: first-aid signs which vary widely from nation to nation (a cross in some, an Islamic crescent in others, the Iranian lion in Iran). The second segment includes "Miscellaneous Symbols," which encompasses auto repair services, telephone, petroleum, lodging, restaurants, picnic goods, camping sites, and other "signs providing useful information."

UN 1968 places standing and parking signs from regulatory signs and from informative signs into a combined category (UN 1969, CORSS, 123-125 TISRP). This study considers such signs in their original "home". This segment consists of a parking sign indicating permitted parking areas. This last-named sign is square in shape with a blue ground and the word or ideogram, in the national language, denoting parking. A second sign in this segment indicates "Exit from a limited Duration Parking Zone." This sign is of square shape exhibiting "a light colour containing 'Parking Prohibited' sign in light gray with a black or dark-grey diagonal band or parallel grey or black lines forming such a band."

c) Aftermath of UN 1968: Implementation and Changes

UN ECE produced *Draft Consolidated Resolution on Road Signs and Signals* (RE2) in 1977. This document included material on informative signs. Topics included "E" Road Identification, Confirmatory Direction, Diversion, Tourist and Speed Limit signs at Frontiers (UN ECE 1977, DCRSS, 4-6 TISRP). The "E" European Road Identification signs include provisions of a detailed technical nature: height of letters, spacing of letters, the dimensions of sign borders and the ratio of height plate to the

letter "E" and numerals. These signs are more thoroughly considered in the European Agreement on Main International Traffic Arteries. DCRSS gives substantial attention to the characteristics for Confirmatory signs.

Characteristics for confirmatory signs include the shape, color, and sign dimensions of the sign. Route Identification signs are to accompany the Confirmatory signs though they are not incorporated into those signs. Route identification signs provide the "national number of the road" information. Further information is also given on Road Identification and on Road Direction Confirmation signs. Diversion, or detour, signs, is a subject of some significance for DCRSS. The signs are defined, illustrated and described. The signs are of an unusual traffic sign hue: that of amber. The large model of the sign gives the locality name ("led to by the road from which traffic has been diverted") and the sign is placed at that intersection from which the detour began. The small model lacks any inscription and is to be found at all intersections of the diversion route. Further provisions include specific categories of vehicles that may be affected by diversions and any necessary advance warning signs.

Three signs are introduced for tourist direction signs: a "Car-sleeper" sign, a Trains sign for cars that are to be loaded onto a train enroute through a tunnel, and a "Ferry" sign for cars to be loaded on a ferry (UN ECE 1977, DCRSS, 4-6 TISRP). A Tourist Information Office location sign is also included. A "General Speed Limit" sign is introduced for installation at the frontiers of a nation which has the purpose of notifying visiting motorists of speed limit information. This sign combines existing UN provisions with new regulations and norms of European design. The signage portion of DCRSS ends with

information on the placement of UN signs for the end of a built-up area in conjunction with confirmation signs and specifications are given for the use of UN signs for “one-way roads with more than one-lane.”

The 1961 edition of US MUTCD considered all guide signs in a single unit but new highway designs dictated a splitting of guide signs into three parts: conventional roads, expressways, and freeways (US MUTCD 1971, ix-xii). Conventional road guide signs include a full array of signs including the traditional forms (route and other markers, direction arrows, destination signs, street name, parking area, rest, recreational areas service signs, etc); many of these signs, which are in the form of markers, have black symbols on a white ground (US MUTCD 1971, Part II-D). Destination signs continued the 1961 practice of green ground and white symbols. Rest, scenic, and service signs exhibit a white symbol on a blue ground in the 1971 MUTCD.

Expressway signs, introduced in 1971, adopt many of the standards of conventional signs (scenic, service, rest, etc) (US MUTCD 1971, Part II-E). But the functions of route markers and destination signs are encompassed within an “interchange exchange signs” with the new Manual. These signs, with a green ground, are often very ample in dimensions and frequently are positioned in an overhead arrangement. They include several sign functions. Freeway signs incorporate some portions of conventional road guide signs but emphasis is placed on large signs incorporating a variety of guidance information (US MUTCD 1971, Part II-F)

Conventional road guide signs in the 1978 edition bear a very strong resemblance to those of 1971 (US MUTCD

1978, Part II-D TIRSP). Service and General Information signs have eliminated the supplemental plates and now rely exclusively on graphic symbols. The 1978 edition has undergone improvements in definitions and clarifications of materials. Other changes include the concept of “sign spreading” and improvements in design and layout of signs. Nevertheless, the general types of signs and the general norms of shapes, color, and message details in 1978 echoes those of 1971.

IAMM 1981 gives extensive attention to informative (guide) signs (RDMCS 1981, SDI Ho 1-89, TISRP). Both the US and Mexico make extensive use of directional signals many of which are found in IAMM/MI as part of IAMM. Both Mexico and the US employ mile/kilometer posts, street signs and varied forms of route markers. Destination signs bear resemblance to those of IAMM/MI though a variant color format is utilized by Mexico and the US. This last point is also true of distance and diagrammatic signs. The category of general information signs and auxiliary services includes a broad range of national differences and nuances. This is especially true of Argentina, Mexico and the US. These signs include signs denoting restaurants, hotels, sanitary facilities, tow trucks, camping sites, and ferry landings. Officially IAMM/MI includes only a limited number of general information signs and then only of major forms. Venezuela also is at variance with standard signs in several instances. For example, Venezuela includes signs denoting dikes and tramways neither of which are IAMM/MI standard signs. The most extensive collection of variant signs is found in Argentina. Several dozen specialty signs have been created in Argentina for tourism and other information needs. Some are shared with one or two other nations but many are exclusively Argentinian.

CHAPTER FIVE
REGULATORY SIGNS

5A Regulatory Signs Before 1968

5A1 Introduction

The term Regulatory Signs has had many competitors for labelling signs dealing with regulations. This is in contrast with signs for warning purposes. In that category only three terms largely encompass that form of sign and those terms overlap: Danger Sign, Danger Warning Sign and Warning Sign.

The term Regulatory Sign is employed by UN GERSS 1952, and US MUTCD 1971. ECAFE 1964 and IAMM 1967 also use the term (UN GERSS 1952, 53; US MUTCD 1971, 282; ECAFE 1964, 11; IAMM 1967, 5). UN 1968 employs the term in a variant form: Regulatory Signs other than Standing and Parking Signs; the later is a special heading. UN 1968 includes three sub-headings under the principal term (UN 1969, 87, 112, 115). However, Amendment 1 (1995) employs the core term instead (UN ECE 1995, 8).

LN 1931 employed the phrase Signs Giving Definite Information as the main heading for this category (LN 1931, 6-7). The term included two sub-headings: Signs Prohibiting Passage, and Signs Indicating an Obligation. Prohibitory or Mandatory Signs served as the main term for LN 1939; that amalgam, when split, became the sub-headings: Prohibitory Signs and Mandatory Signs (1938, CCT/CDR/.1 Tbl III, 3).

UN 1949 altered the 1931 term to Signs Giving Definite Instructions with the sub-headings from LN 1939. (UN 1949, 80). Prohibitory and Mandatory Signs serves as the main heading for CASATC 1950 with the selfsame subheadings (CASATC 1950, 77).

UN GERSS 1952 divides regulatory signs into two uneven groups: Stop Sign, and Other Signs. ECAFE follows this pattern. (UN GERSS 1952, 53, 54).

Canada, while a national system, offers a innovative approach to TCDs in many ways. Canada employs regulatory signs for its main sign terms. Sub-divisions include Right-of-Control Signs (divided into stop, yield, pedestrian crossing control)), Road Use Control (with eight segments), and Miscellaneous Control Signs (UTCDC 1976, A1.02).

Several Nordic nations created a joint traffic code at the behest of the Nordic Council. In the detailed working out of provisions Norway produced a version including classes of signs. Instead of regulatory signs as a group they opted for prohibitory signs and for mandatory signs. This reflects Protocol practice whether the two groups are separate categories or groupings within regulatory signs (G & L 1967, 49-50 TISRP).

The material of this sub-chapter is set within a framework of the classification in Part H, 2nd edition, 2003. The outline (and a form of classification) in TCD Database (1998) also influences this coverage. The main classification includes four main sub-divisions: Priority Signs, Prohibitive and Restrictive, Mandatory, Standing and Parkings.

5A2 Regulatory Signs, 1952-1967

This segment of Regulatory Signs (1952-1967) is a review of events in the years preceding UN 1968. It includes a coverage of UN GERSS 1952, ECAFE 1964, IAMM 1967, and the US. Central America, Ireland, United Kingdom, Scandinavia, Canada are also reviewed.

GERSS followed the octagonal shape for the stop sign. The ground was yellow with a vertical and horizontal bar bisecting the sign plate. The ground for the stop sign in the US was also yellow in that time. The word inscription was in yellow (UN GERSS 1952, 53-60). Other regulatory signs were in the shape of a disk or rectangular plate. The disk was to have a light-colored ground, and a rim or border of a darker color, and with graphic symbol or word inscription. The formulation for rectangular shaped signs was similar. The rectangular sign was “surmounted by, or embody, a disc with a border or border darker than the ground of the disc”; the disk could be hollow.

The oblique bar represents prohibition and nothing else for GERSS (This refers to the bizarre tale of the oblique bar at UN 1968) (UN GERSS 1952, 53-60 TISRP). A sign with a limiting or mandatory function is not to have an oblique bar. The Draft Convention is recommended the color red for the oblique bar and rim. The Convention also included sizes for regulatory signs as well as titles and messages for the regulatory signs.

GERSS has a single approach to regulatory signs (save the stop sign) in color and graphic symbols. If an action was not to be taken then the basic symbols was encircled in red with a red oblique bar. Osborne notes that Protocol divides regulatory signs into prohibitory and mandatory

forms with a blue and white scheme for required actions in contrast to prohibited actions. He seemingly saw that as a superior practice (Osborne 1967, 20). Though a single system with requisite red circle and oblique bar presents a clear picture. As is noted later in this segment Canada creates a different approach to required actions.

A number of comparative and contrasting points can be made about ECAFE and GERSS regulatory signs. The Stop sign can be either round or octagonal in ECAFE practice. This choice of options is in contrast to the American system and GERSS. The distinctiveness of the octagonal-shaped stop sign resides in that unique shape. Other shapes lack that singularity and, hence, the availability of an option reduces that uniqueness (UN ECAFE 1964, 11-13, 26-27 TISRP). The round version of the stop sign can exhibit a white or a light yellow or yellow ground. It further displays a red border and red word inscription. The octagonal form follows the GERSS practice and a word inscription (STOP) is mandated for this form.

ECAFE opted for the round shape for other regulatory signs with a choice of three colors: white, light yellow, or yellow (ECAFE 1964, 11-13, 26-27 TISRP). These signs display red borders with a symbol in black (or a dark color). ECAFE emulates the GERSS practice in the matter of the red oblique bar even though ECAFE substantially created the oblique bar dilemma at the UN Conference in 1968. ECAFE specifies larger signs for regulatory signs than GERSS. Symbols for regulatory signs are identical to those of GERSS.

Since the US MUTCD edition of 1948 was published before UN Protocol 1949, and UN GERSS 1952. US TCDs were, therefore, untouched by the first global efforts

at a common TCD system (League of Nations efforts were more in a European region mode; UN 1949 is somewhat in that mode as well). The 1961 MUTCD follows after 1949 and 1952 efforts and therefore one may assume that traces of influence of early world-wide efforts can be seen in the 1961 MUTCD. A review of points in common and those not in common may also be in order.

Word messages dominate the 1961 edition as much as that of 1948. One exception to word dominance is an alternate form of the "Road Narrows" sign in 1961 (US MUTCD 1961, 54 TISRP). The use of diamond-shaped warning signs with yellow ground and black symbols is as common in 1961 as in 1948.

New regulatory signs in MUTCD 1961 included: Minimum speed, u-turn, lane-use, pass with care, slower traffic keep right, uphill traffic, reversible flow and periodic one-way, one-way transition, keep-off median, and local traffic signs (US 1961 MUTCD, Part I-B). Perhaps the most important new sign is the Yield sign. This sign was first employed in Oklahoma in 1951 (Sessions 1971, 122-123). A few signs of the 1948 MUTCD were eliminated in the 1961 Manual; those changes did not great alter US sign practice.

Canada produced a manual for its traffic control devices in 1960. A major innovation was the green annular ring which seemingly originated with that nation. The green ring around a symbol (such as straight straight arrow, or a right turn arrow) required executing the indicated action. This contrast with the more familiar red ring and oblique bar denoting an action not to be executed (Finnbogason 1963, 25).

Two followers of GERSS warning signs followed divergent paths for regulatory signs. Ireland adopted the UN practice of Protocol signs (Ireland 1979, 60-61). The Central American nations adopted GERSS form of sign which includes offers a single system of regulatory signs (with red circle and oblique bar when needed) (Zuniga 1970, 1 TISRP). IAMM followed GERSS on regulatory signs and permitted regulatory signs to be either discs or rectangular-shaped sign plates. This reflects GERSS practice (UN GERSS 1952, 53-60).

5B UN 1968 and Aftermath

5B1 The Building of the UN System

A review of the end results of the UN Conference on Road Traffic might suffice for this study. However, the process leading to the end results can provide insights, and understanding into what transpired. This coverage takes up the Draft Convention of 1967 including both Articles and Annexes. It also examines the *Proposals, Suggestions, and Observations* document of 1968 (UN 1968, PSOC-RSS).

Changes in two Articles pertain to Regulatory signs. Article 10 gives two models of the stop sign: the 1949 Protocol model, and the American system octagon (UN 1967, DCRSS, 5 TISRP). Both models display the symbol STOP. The 1949 Protocol sign is given preference which was also the case with danger warning sign models. Article 10 also permits the STOP sign for use at level (railway grade) crossings. Article 12 in the new draft allows for a "black arrow on a white ground with a black border" even if some other mandatory sign is present.

A group known as the International Prevention of

Road Accidents (PRI) wanted uniformity in signs and no choices among sign models (UN 1968, PSOC-DCRSS, Annex 4). The PRI viewed the octagonal stop sign as "undesirable" but was ready to compromise on one type per geographical region; regional or hemispheric sign types are found in the final documentation (UN 1968, PSOC-DCRSS, 14, TISRP). The USSR indicated a preference for what is often termed the "European stop sign" listed as B.2a and not as B.2b. The American stop sign, presently B.2a, was then to become an option instead of a standard sign type.

A comparative review of UN 1967 DCRSS and the final and published draft, UN 1969 CORSS (which was closely based on the working draft of the Second Committee and of the Conference) indicates a variety of changes that encompass minor alterations of text, major revisions, and even the deletion or addition of new articles. The more notable changes can be briefly reviewed.

Articles 5 to 8 contain general information on the signs in the drafts. Article 5 (b) 1 under the title "Priority Signs at Intersections" in the older draft, became simply "Priority Signs" in the final draft (UN 1967, DCRSS, 7, 10; UN 1969, CORSS, 83-86 TISRP). Articles 10 to 13 are entitled "Regulatory Signs" in the older draft but as "Regulatory Signs Other Than Standing and Parking Signs" in the new (UN 1967, DCRSS, 11-14; UN 1969, CORSS, 87-91 TIRSP). Article 10 replicates the change for Priority signs as in Article 5.

The Annexes of the Convention provide more details on the various types of signs in regard to dimensions, colors, arrangements of colors, and other more technical points than are to be found in the Articles. The text

Annexes (which follow upon the end of the Articles) of E/Conf. 56/3 include the illustrations while the final version includes them in a special Annex.

Changes in Annex 2, Section A include altering the name of the "Yield Right of Way" sign to "Give Way sign, B 1 (UN 1969, CORSS, 112-113, 154). Sign 3, "Priority Road" sign, B 3 is to exhibit a yellow or orange hue in the new draft (UN 1967, DCRSS, 2, Annex 2; UN 1969, CORSS, 112-113, 154). Sign 4, "End of Priority," in the new draft gives the color scheme as one exhibiting a gray or black medium band or parallel lines (UN 1967, DCRSS 3, Annex 2; UN 1969, CORSS, 112-113). Information on which symbol is to be used for the Stop Sign has been expanded in B 2. An alternative practice section has also been added to B 2. Reworking of material gives unified coverage to Yield Right of Way at Intersections signs (UN 1967 DCRSS, 5, Annex 2; UN 1969, CORSS, 113, 152). Section C of this Annex changes the color format from light yellow to yellow; this color change is to be found throughout the new draft (UN 1967, DCRSS, 6, Annex 2; UN 1969, CORSS, 114). "Regulatory Signs Other than Priority, Stopping, and Parking" becomes "Regulatory Signs Other than Priority, Standing and Parking." Both versions reflect UN 1968 practice of subdividing regulatory signs into segments. (UN 1967, DCRSS, 1, Annex 4; UN 1969, CORSS, 115).

In the new draft the No Entry sign has two models, C, 4a and C, 4b; C, 4c has been dropped. In the older draft these signs had a divergent design: the first had a single horizontal bar, the second had a three-way bar, and the fourth displaced an "X" (UN 1967, DCRSS, 6, Annex 4; UN 1969, CORSS, 116). The new models display instead the standard diagonal oblique bar (UN 1969 DCRSS, 117,

157). Section A further prohibits a sign to have more than three symbols in a built-up area; a maximum of two is permitted in non-built-up areas (UN 1967 DCRSS, 8-9, Annex 4; UN 1969 CORSS, 117). Sign C 13a, Overtaking Prohibited, in permits passing by both motorcycles and mopeds in the newer draft (Par (d) (ii) of Section A; UN 1967 DCRSS, 2, Annex 4; UN 1969 CORSS, 117).

In the new draft there are two models of Prohibition of Overtaking signs, and two models of Overtaking by Goods Vehicles Prohibited Signs (UN 1967, DCRSS, 8-11, Annex 4; UN 1969, CORSS, 117-118, 158). Finally, the option of dropping the full "red oblique bar" (C, 13) is eliminated (UN 1967 DCRSS, 9, Annex 4; UN 1969, CORSS, 1969, 118). Paragraph (f) specifies an additional panel ("Model 2") for the purpose of indicating "the distances over which prohibition applies". The "End of All Local Prohibitions Imposed on Moving Vehicles" sign undergoes a change of color from light yellow to yellow.

Paragraph 1 (a) of Section B, "Mandatory Signs," permits signs with a diameter of "not less than .30m to be used in conjunction with traffic light signals or on bollards on traffic islands" (UN 1969 CORSS, 118-119 TISRP). An alternate sign format is permitted that displays white ground, red rim and black symbols. Other signs are repositioned in the document and new signs are added included an alternate to the established "Pass this Side" sign, and a Compulsory Roundabout sign.

Standing and Parking signs (Annex 6) in the older draft required a color scheme of half blue and half-white while a color scheme of blue ground, red border and bar is given in the new draft. The new draft renames the the "Stopping and Parking Sign" as the "Standing and Parking

Sign" (UN 1967 DCRSS, 1-3, Annex 6; UN 1969 CORSS, 123-124 TIRSP). Paragraph 1 of Section A of this Annex has undergone a measure of reformulation; especially noteworthy is the permission to replace Sign C, with a "circular sign with a red border and a red transverse bar, bearing the letter or ideogram to denote parking, in black on a white or yellow ground. The new draft permits the usage of C, 18 (the basic prohibition signs) in countries not employing C, 19, C, 20a, and C, 20b (more specialized sign messages) and the sign is redesigned. Paragraph 3 retains the meaning of the old draft but a re-arranging and reworking of the materials has taken place.

Section B of Annex 6 has undergone a measure of re-arrangement in the new draft though the meaning approximates that of the old draft. The phrase "light ground for parking signs has been excised and replaced by a specific color, that of blue (UN 1967 DCRSS 4-5, Annex 6; UN 1969 CORSS, 125 TIRSP). An alternate color scheme has been added for the "Exit from a limited duration parking zone sign". The new annex shortens, simplifies parts of the older draft (Model 1 is kept but not a) and b) variants of Model 1; Model B is dropped).

5B2 The Problem of the Red Oblique Bar

Perhaps the strangest, and even the most incredible element, of the 1968 UN Convention on Road Signs and Signals is the "Note" following Paragraph 2 (a) (iii) of Section A of Annex 4. The "Note" states that, "It shall be open to contracting parties to omit from signs C, 3a to C, 3k (Prohibition and Restriction of Entry signs) the red oblique bar joining the upper left quadrant and the lower right quadrant or, provided, that this does not make the symbol less easy to see and understand, not interrupt the

bar where it crosses the symbol” (UN 1969 CORSS, 115-117 TISRP). This provision applies to all signs prohibiting entry for a “certain category of vehicle or road user.” It does not apply to the general no entry sign, to signs that indicate “closed to all vehicles in both directions,” or to those having reference to several categories. The C, 13 signs for overtaking prohibited follow the same option though not specifically listed in the “Note.”

The Note is strange because it clearly states that the sign has the same meaning whether the oblique bar is included or whether it is excluded! The problem is compounded by the “Closed to All Vehicles in Both Directions” sign which is circular with a white ground and red border and no oblique bar (UN 1969 CORSS, 115-117 TISRP). One might have assumed that a sign without an oblique bar constituted a permission for the vehicle to enter. But the sign in question is clearly a no entry sign. Yet other signs (for example, “No Left Turn”, “No Right Turn”) require the oblique bar without option of omission. In short, there is no consistent principle on the use of the bar and on the meaning that the bar, or its absence, has.

A review of the development of European-style regulatory signs may aid an understanding of how the problem came about. An extension of that review which includes the oblique bar may provide further implications of the paradoxical matter. Though it may not provide an understanding of how such an illogical situation was allowed to happen.

In all likelihood there were regulatory signs in use in Europe before 1931. But no official recognition of an international character of such signs occurred before then. The 1931 “Signs Prohibiting Passage” were circular with a



wide red border and a white or yellow center (LN 1931, CCURS, 6-7; also Table II, figure 2, TISRP). An exception was the “One-way” sign which had a red ground and a white transverse bar (this sign has become nearly universal including the US). Most of the other signs had a symbol placed on the white ground and within the red border. Oblique bars (then termed “diagonal red strokes”) were found only with signs prohibiting parking and waiting. The waiting signs contained a blue center, red border and the red oblique bar. The bar has a restricted and clearly understood function in 1931.

The 1949 Convention followed the direction laid down by the earlier agreement but expands use of the bar. “Turning to the Right” (or Left) Prohibited” signs were added and they included the bar (UN 1949, Protocol, 92 TIRSP. If previously the red border on signs clearly signified prohibition or restriction it now developed a fuzzy meaning since some prohibition signs required the bar and others did not; in fact almost all Protocol prohibitive signs lacked the bar. A no passing sign (termed “Overtaking Prohibited” sign) was added and this portrayed a symbol of one red car and one black car but without the bar. This sign also generated confusion.

But the broad expansion of usage of oblique bars did not begin in 1949. Nor did oblique bars begin with the earliest draft of a revised signs and symbols system leading to the 1968 Convention. The change can be traced to one of the regional commissions most heavily involved in the review and alteration of the original draft before the 1968 Convention: that of the Economic Commission of Asia and the Far East (later Economic and Social Council of Asia and the Pacific [ESCAP]) (UN 1967 DCRSS-NSG .56/4, 12).

ECAFE made the proposal to include oblique bars on a wide selection of regulatory signs of a prohibitory or restrictive nature referring to single categories of vehicles. Specifically, ECAFE requested that the red oblique bar be added to the signs of C.13a and C.13b; this request was approved (UN 1967, DCRSS-NSG .56/4, 12). A qualifying clause was added stating that the signatories may omit the oblique bar for these signs! (see previous source note). Was this clause added in a spirit of compromise without duly appreciating the implications of visually variant signs signifying identical messages? The European Economic Commission (ECE) countered with a proposed amendment to omit the oblique bars from signs C.3a to C.3H and C.3j to C.3k and C.13a and C.13b but this amendment was not approved (UN 1967, DCRSS-NSG .56/4, 35, Annex 1).

The problem is compounded by the provisions of the *Final Report* of GERSS in 1952. This report clearly included the oblique bar for regulatory signs that indicate prohibition. However, "signs indicating limitations or compulsion shall be without such an oblique bar (UN 1952 GERSS, 54-55). This means that GERSS mandatory signs conform to the optional prohibitory signs but with the opposite meaning (Zuniga 1969, 5).

The problem of the oblique bar and its appearance/disappearance was not overlooked by various participants in the 1968 Convention though the initial alteration of the pre-Conference draft was never overthrown. The USSR proposed that the oblique bar be omitted from signs C.3a to C.3k (UN 1968, PSOC-DCRSS, 53-54 TISRP). It was noted that the bar reduced the clarity of the symbols for these signs since they partly obscured the symbol. But the principal justification for this proposal was the view that

oblique bars can not be employed with the adjoining group of signs, C.4 (C.4a, "No Entry for Power Driven Vehicles"; 4b, the message of 4a plus, "Animal Drawn Vehicles"). Therefore, the concept of symbolizing prohibition by the bar "cannot be consistently maintained." This means that the significance of the oblique bar "loses its meaning altogether."

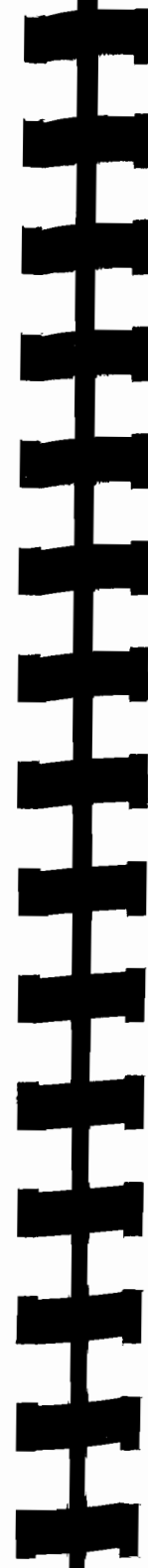
The International Road Federation (IRF) requested that the "signs with a red border and a symbol on a white ground (presumably without the oblique bar) should be retained as the standard type and not as an optional alternative since the proposed modifications would involve considerable expense and would have no compensating advantages." (UN 1968, PSOC-DCRSS, 53-54, TISRP). The international Union of Official Travel Organizations (OTA) also called for the elimination of bars for C.3 series signs. OTA justified this proposal by the view that "the symbols merely supplement sign C.2 'Closed to all Vehicles in Both Directions,' which has no bar." OTA further noted that these signs should be termed "'Closed to ...' and not merely 'No Entry ...,' a prohibition which is notified by sign C.1."

The contention that the bar was not needed was further buttressed by the International Association for the Prevention of Road Accidents (PRI). This organization saw the oblique bar as an encumbrance on the effectiveness of the symbol (UN 1968, PSOC-DCRSS, 55). It is illogical since sign C.3f has an oblique bar but not C.8 and C.9. The bar can create misunderstandings; e.g., C.13 signs can be confused with C.4 signs (C.13 signs refer to overtaking or passing; C.4 refer to no entry signs). Therefore, in the view of PRI, "[t]he option allowed in the last sub-paragraph of paragraph (d) for only two signs should therefore become

the general rule. The red oblique bar should be retained for signs C.11a [No left turns], C.11b [No right turns], C.12 [No u-turns] and possibly C.15 [Audible warning devices-prohibited].

But other nations opposed elimination of the bar. Denmark, Norway, and Sweden proposed elimination of the option of dropping the oblique bar (UN 1968, PSOC-DCRSS, 54-55). This proposed change would apply to Signs C.3a to C.3k inclusive and signs 13a and 13b. This change would result in more easily understood meanings for regulatory signs. The bar represents a “complete no” better than sign symbols that lack it. It should be noted, in the view of the previously named nations, that a rational system even without the bar is superior to a system lacking uniformity; it would be better to drop all bars than to have signs sharing a marked degree of affinity to present an uncertain message projection by some having the bar and others eliminating it. These remarks refer to signs C.11a, C.11b, C.12, C.15. Japan proposed replacement of C.2 with a new version that includes the oblique bar (UN 1968, PSOC-DCRSS, 8, Addendum 2). This would create a situation in which all signs, C.2 through C.3k would then be uniform. This specific sign is in use in Japan (PICHSS 1972, 37).

While the views of the Western Hemisphere nations are not represented in the PSOC-DRSS, the Technical Committee on Traffic and Safety (Pan American Highway Congresses) considered the 1967 draft of the pre-Convention documents (PAHC 1968, TCTS-FR, 12-13). While it did not touch directly on the oblique bar it did make an oblique reference to the matter: the *Final Report* gave final approval to the *Inter-American Manual* which followed the recommendations of GERSS which included



the oblique bar (PAHC 1968, TCTS-FR, 9). The *Final Report* also reviewed the UN draft convention but did not follow the confusion-generating ideas on use and non-use of the oblique bar (PAHC 1968, TCTS-FR, 9). The Technical Committee (PAHC) of Pan American Highway Congresses did express concern about the color blue being used in regulatory signs as well as in certain guide signs; it was also concerned about the use of red in both regulatory signs and in warning signs (PAHC 1968, TCTS-FR, 12).

A review of the decisions by the Second Committee (UN) does not indicate any change in the matter of the oblique bar nor, seemingly, even a consideration of the issue (UN 1969, SR 1-8th, 24-26). An examination of the “Summary Record of the Sixth Plenary Meeting” also fails to uncover changes or even mention of the contradictory message problem that had been created (UN 1968, SR, 23rd, 8).

A major critique of the issue can be found in the writings of Jose M. Zuniga (a one-time staff engineer of the International Road Federation). Zuniga presented his views orally at the 48th annual meeting of the Highway Research Board of the US National Research Council (Zuniga 1969, 1 TISRP). He noted that the option of not using the oblique bar was extended to some signs but not to others. The lack of consistency is heightened by the GERSS document in which mandatory signs resemble some UN regulatory signs though with reverse meanings.

Zuniga further noted the work of the British Road Research Board which criticized the 1949 UN Protocol which had introduced the “No Right Turn (or Left)” sign with an oblique bar while displaying a “No-cycling” sign without an oblique bar (Zuniga 1969, 5-10, TISRP). The

reason for omission of the bar? a concern that to do otherwise would hid the symbol beneath the bar. However, testing carried out by the BRRB found that untrained school children performed very well in identifying 1952 GERSS regulatory signs with bars and performed very poorly identifying 1949 Protocol signs without bars. It was further found in Britain (after approval of the 1949 sign system in 1964) that the English motorists were ignorant of the meaning of a variety of Protocol signs and, in fact, the response of the British motorists paralled that of English school children several years earlier.

A two-fold solution is readily available in this matter of the regulatory signs and the red oblique bar. One aspect would require that regulatory signs follow the GERSS pattern and include the oblique bar. The second aspect would require adoption of the Canadian green annular rings for mandatory signs. The rings, identical in shape to those of the UN and of GERSS -- save for color -- denote a positive instruction that requires following the injunction symbolized by the sign (Van Vechten 1969, 15). For example, a green ring around a left-turn arrow indicates that all traffic must turn in that direction (Canada 1976, A.109, A.2.30, A.231, A.232). A red-ring around a speed or weight limit, for example, would then clearly indicate a negative restriction.

Zuniga sees political considerations at work over more technical ones in the UN deliberations (Zuniga 1969, 14). This has resulted in compromises and allowances for contradictory signs and sign messages to attain official status. The UN did not take the best of various approaches (the method employed by GERSS) but amalgamated ideas from different systems with an end result far from desirable and perhaps far from promoting safety which was the

avowed aim of the Conference.

5B3 Regulatory Signs at UN 1968

UN 1968 apportions regulatory signs among three groups: priority signs are added to danger warning signs at intersections (UN 1968, 112-119 TISRP). Priority signs can be either at intersections or narrow sections of roads. The principal regulatory category includes prohibitory and mandatory signs but excludes priority and standing and parking signs. The third group for standing and parking signs includes regulatory signs and informative signs. This coverage reverts to the traditional regulatory sign category. The classification has four main groups: priority, prohibitory and restrictive, mandatory, and standing and parking.

“Priority at Intersections includes the vital signs of “Give Way” (or “Yield” sign) and “Stop” (UN 1969, CORSS, 112 TISRP). The “Give Way” sign indicates that the motorist is to give way, or give precedence, to the traffic on the road which bisects the road on which the aforesaid motorist is on. There is a single form of this sign and it takes the form of an equilateral triangle with the vertex downward. The ground of this sign is either white or yellow and this is accompanied by a red border. There is no word inscription on this sign according to UN documentation. However, at least in the US the word “Yield” is frequently found in use. The sign can measure from two to three feet on a side (0.60 m to 0.90 m). The Stop sign has two forms: the European and the American models. The American model is an octagon while the European (though that is more and more of a misnomer) form is circular in shape. The former has a red ground and red border; the later has a white or yellow ground and red border. The European model presents a complex symbology: the “Give

Way” symbol accompanied by the word inscription “Stop” within a circle. The American version exhibits a red ground with the word stop in white letters. The octagon sign is from two to three feet in height and the circular is two to three feet in diameter.

The remaining Priority at Intersections signs include the Priority Road sign and the End of Priority sign (UN 1969, CORSS, 112-113 TISRP). In the first-named sign the drivers have priority over traffic on other intersecting roads. “End of Priority Signs” are posted at the point at which the priority of the road ceases. The priority signs is a diamond-shaped sign with a black rim, and a yellow or orange insert in the shape of a diamond. The insert has a black rim as well, with the intervening space white. The signs is from one-foot and two-inches to one and three-quarters feet on a side (0.35 m to 0.5 m). The “End of Priority” sign consists of the previously described sign with the addition of a black or gray band running diagonally across the sign; the band can be solid, or it can be made up of parallel stripes.

“Priority Signs on Narrow Section of Roads” constitutes the second sub-category of priority signs (UN 1969, CORSS, 114 TISRP). A sign indicating that oncoming traffic has priority consists of a round sign with a ground of yellow or white and a red border. This sign contains a black arrow indicating the direction of priority, and a red arrow for the subordinate directions. A second model of this sign projects a rectangular shape with a blue ground and white arrow pointing upwards and a red arrow pointing downwards. Again, the priority arrow is black, and the subordinate arrow is red.

“Prohibitive or Restrictive” signs constitute a sub-

category centered on prohibitory matters (UN 1969, CORSS, 115 TISRP). This model of sign is circular in shape and at least two-feet in diameter “outside built-up areas” and at least one and one-quarter feet in diameter (0.40 m to 0.60 m) in “built-up areas.” These signs exhibit a yellow ground with an accompanying wide red border. Symbols and inscriptions are black or dark blue; oblique bars, when present, are red in color. The “No Entry” sign, which denies entry to all vehicles, is comprised of a circular-shaped sign with either red ground and white transverse bar, or red rim, white ground, red oblique bar and black arrow pointing upward. The signs so far described are general purpose signs. There are more specific forms. In these models the prohibited object replaces the arrow. Prohibited objects include vehicles, motorcycles, bicycles, pedestrians, animal-powered vehicles, tractors, and vehicles exceeding a specified width, height, or weight.

Prohibitory signs pertain to other matters as well. For example, restrictions on turn maneuvers include “No-turn” signs which in turn include “No Left”, “No Right” and “No U- Turns” (UN 1969 CORSS, 117 TISRP). These signs represent normal prohibition sign designs with the addition of an appropriate arrow denoting the prohibited type of turn maneuver. Prohibitory overtaking (or passing) signs include prohibitions for vehicles in one direction, and in two directions. There are yet other signs prohibiting passing by goods (freight) trucks; these portray, through graphic symbols of a red truck and a black auto. A variant form illustrates both of these symbols in black but with a diagonal red bar across the underlying symbols.

Prohibitory signs for speed limits constitute a variant classification entry. It is a single form though with many message configurations. In bureaucratic parlance this sign

indicates "Maximum speed limited to the figure indicated" (UN 1969, CORSS, 117). Other prohibitory signs include "Prohibition of the Use of Audible Warning Devices" and "Prohibition of Passing Without Stopping" signs (UN 1969, CORSS, 117-118). The last-named indicates a required stop at an adjoining customs house. A symbol denoting the word "customs" is to be included in the sign symbol.

Ending of prohibition or restriction signs completes this category of signs. The "End of all Local Prohibitions Imposed on Moving Vehicles" is installed where the prohibition ceases (UN 1969, CORSS, 89, 118, TISRP). This sign is circular with a yellow or white ground. A black rim is allowed but the sign has no border. A gray or black band (or stripes in the same color) completes this sign. This sign is the general prohibition end sign. There are also signs for particular types of prohibition endings. These include the "End of Speed Limit" and "End of Prohibition of Overtaking" (or Passing). The diagonal bar is light gray for the last named signs.

Mandatory signs make up the final sub-category of regulatory signs. These signs are circular in shape and at least two-feet in diameter for areas "outside of built-up areas" and a minimum of one and one-quarter feet in diameter (0.40 m to 0.60 m) in "built-up areas." (UN 1969, CORSS, 89, 118-119, TISRP). Mandatory signs are blue in ground with white symbols; white signs with red rims and black symbols can serve as an alternative. The symbols are arrow(s) indicating the correct direction(s). An alternate can be employed: a rectangular sign of markedly elongated horizontal dimensions with black ground, white rim, and white arrow symbols. This sign can be term an American model, while the first described model can be designated European (also known as international). Other mandatory

signs include the compulsory "Roundabout", "Cycle Track," "Foot Path," and "Horseback Rider Path" signs. Further mandatory signs include Compulsory Minimum Speed, End of Compulsory Minimum Speed, and Compulsory Snow Chains signs.

5B4 Aftermath of UN 1968: Regulatory Signs

1968 UN had an effect on regulatory signs as it did with warning signs. Again, a disproportionate portion of the following comments center on Europe and the Americas.

ECE opted for the American system Stop sign rather than the European-based model; that is B, 2a instead of B, 2b. It will be noted that B, 2a was narrowly defeated in the UN Convention as the sole stop sign model for the world. Despite that defeat it is becoming commonplace throughout the world. (UN ECE EASCRSS 1971, 3-4, ECMT 1972; ERCRTSS, 59-61, TISRP).

A third document has an impact on European regulatory signs. This document, *Draft Consolidated Resolution on Road Signs and Signals (R.E.2.)* (UN ECE 1977, SCI/R.15/Rev 1; hereafter DCCRSS). The provisions of DCCRSS cover a broad range of sign-related topics including sign requirements for level-crossings, the interaction of tramways, trolley-buses and trains with pedestrians and motor vehicles, lanes for slow-moving vehicles, and thawing conditions on roads. Tramway, trolley, and trains on roadways which are exempt from the authority of a road sign are to have this fact announced by an inscription on the road sign in question (UN ECE 1977, DCCRSS, 3-4 TISRP). Advance announcement of lanes for slow-moving vehicles on steep grades is introduced through a new sign. Other signs for such lanes consist of

UN standard signs for maximum speed limits, and for announcing of the end of slow-moving vehicle lanes. Two provisions affect signage for level-crossings. Both disallow the use of a specific sign when used in conjunction with standard signs at crossings.

In the Western Hemisphere the US MUTCD for 1971 continued to have a strong word-emphasis for sign symbols. The European originated "Circular red Do Not Enter symbol" was to be found in the 1971 Manual (Fowler, 1970, 28). The Yield sign becomes white in ground, red in border and inscription. The black inscription on yellow ground of the 1961 version is eliminated (Fowler 1970, 28). The observation of one observer that more graphic symbols "would readily permit practical international uniformity" (Shoaf 1971, 60) suggests strongly that graphic symbols had yet not reached a meaningful level in the US. The Stop sign remained the same and in fact became a major "export" to other nations and regions. The US became isolated, however, as Canada and the *Inter-American Manual* adopted more and more graphic symbols (Shoaf 1971, 61).

A variety of signs (No Right Turn, No U-Turn, No Trucks, etc.) are given two versions in the 1971 MUTCD (US MUTCD 1971, Part II-D TISRP). The old word message is presented as an alternative while a new graphic symbol version is introduced; these later types also contain a word message which is mounted beneath the graphic symbol form. The new international version of Do Not Enter is supplemented by a Wrong Way word message is allowed as an supplement to the "parent" form. All urban and rural parking and stopping signs either exhibit a permissive (green borders and symbols) or a negative (red borders and symbols) in 1971. Previously they were in

black on white. Only the Emergency Stopping and Parking signs for expressways maintain the old motif. Hawkins notes the introduction of the No Passing Zone sign in pennant form with red ground in 1971. Only stop and parking signs used red before 1971. The railway crossbuck sign switched from warning to regulatory status in 1978 (Hawkins 1992, 20). Hawkins comments on several significant changes for the 1988 edition but none of these seemingly referred to regulatory signs (Hawkins 1992, 22).

A review of 1978 MUTCD shows a continued shift to a graphic-symbol stance. Some of the graphic symbols of 1971 that were in tandem with word-messages have become exclusively graphic in 1978 (for example, Turn Prohibition signs) (US MUTCD 1978, 15). Nonetheless, examples of alternative word messages remain, including the Keep Right and Pedestrians Prohibited signs (US MUTCD 1978, 2B-18 and 2B-21, 2B-29). The role of word message signs is still strong but there is a definite decline in such signs.

Canada's green annular rings, dating back to 1960, have a prominent role in the 1976 edition of UTCDC. Canada has clearly and logically answered the problems of the oblique red bar of UN 1968 for many users. Canada has improved upon the mandatory signs of GERSS as well. Canada employs the oblique red bar on all prohibitory signs ("interdictory symbols") or negative messages (Canada UTCDC 1976, A1.09 TISRP). There are no other options for the use of the bar. However, mandatory signs are to exhibit a green ring. These are positive in nature and they indicate mandatory or permissive messages. Representatives of each include No Turn signs which exhibit the red oblique bar; Left or Right Turn signs which are mandatory exhibit a green ring; signs indicating prohibition of trucks

or cyclists have the oblique bar; a truck route sign has a green annular ring. These signs are rectangular or square in shape with the symbols painted onto the signs. Signs of a circular shape are seemingly unknown in Canada.

The number of signs exhibiting circular symbols is less in Canada than in the UN system (Canada UTCDC 1976, A1.09 TISRP). Signs such as Speed Limit signs follow the rectangular pattern with a white and black format; numbers for speed limits are the same as in the US. The concept of green rings denoting positive messages and red rings, with oblique bars, for negative messages has much to recommend itself to other nations.

The 1981 revision of the *Inter-American Manual/Manual Interamericano* was carried out under the auspices of Mexico. The revision is a vast volume measuring nearly a foot in width and two feet in length (RDMCS 1981 TISRP). The layout of the volume has bearing on regulatory and other signs. It refers to the Manual in its entirety but it also gives more specialized attention to selected nations in the hemisphere. The volume is three-columned with the Manual occupying one column, one for proposals and one bifurcated into a Mexico sub-column and the a second variously occupied by several nations: Venezuela, Argentina, Ecuador, Uruguay and the US. The substance of the publication (the specifically IAMM/MI part) is in accord with the 1967 edition. The format of the volume allows for national differences; it gives considerable attention to Mexico, the sponsoring nation. It can be noted that the Mexican nation has given considerable attention to a meaningful system of traffic control devices and extensive coverage of that system would have been required even with a different formulation of the Manual. The 1981 edition of the Manual is entirely in Spanish.

The Stop sign follows the design of 1967 (which came from US MUTCD; RDMCS 1981, SDR, Hoja 22, TISRP). The Spanish "pare" is used in place of the English stop. Uruguay retains the same shape but adds a broad middle bar with "pare" on the bar. Mexico substitutes "alto" (halt) for "pare." Mexico's stop sign has a white rim and a red ground instead of the more common red ground with a white rim set inside the outermost edge of the sign. The IAMM/MI Yield sign retains the 1967 appearance. The US retains the same shape but with a broad red border and the world Yield is included on the sign.

Other regulatory signs emulate the older edition (RDMCS 1981, SDR, Hoja No. 22, TISRP). This means essentially that both versions accent the graphic symbol stance. The US has increased graphic symbol usage but it continued to employ more word message embossed signs than other hemisphere nations. Many of Mexico's regulatory signs follow the IAMM/MI designs but without following the common circular shape of signs. Most Mexican regulatory signs consist of the appropriate symbol within a red circle but this is imprinted on a square sign plate; Canadian practice is very similar in this regard.

Uruguay offers a series of speed regulation signs that are somewhat at variance with hemispheric practice. This is true of both minimum and maximum forms (RDMS 1981, SDR, Hoja No. 17-22 TISRP). Both Mexico and the US have signs for specific categories of vehicles. For example, an exclusive bus lane. The UN sign excluding several categories of traffic can be found in the US and in Mexico though seemingly this sign is not found elsewhere in the hemisphere.

Formerly, Africa, Asia, and the Pacific areas were active in traffic control device developments highlighted by CASATC and ECAFE. Neither system has been updated. At least three nations in that vast area have engaged in practices that can be noted here. The Republic of South Africa (a centerpiece of CASATC) has adopted the Protocol style of UN 1968 (van der Nest 1972, 140-42, TISRP). South Africa has made some changes and deviates from that norm. One such change (and one that is labelled "minor") is of considerable consequence: the red oblique bar is retained wherever possible for prohibitive signs. Dark blue is the ground color for all signs excepting stop, yield, no entry, priority signs. Red serves as the ground color for stop and no entry signs.

Japan revised the traffic code of 1963 in 1970. Existing ideas, UN 1968 and ECAFE 1964 were elements in the changes. Japanese regulatory signs, following established practice, were divided into regulatory and indication signs (Kikura and Matsushita 1972, 31-33, TISRP). General usage of the red oblique bar was approved. The US style of the stop sign was dropped in favor of the UN Protocol model. ECAFE favored a black ground, white arrow and red rim for a variety of mandatory signs but Japan preferred a blue ground with white symbol.

Australian practice as appearing in the *Manual of Uniform Traffic Control Devices*, 1975 includes Australian practices, UN 1968 and US MUTCD elements (ACORD MUTCD 1975, 5-6 TISRP). Some signs are very similar in appearance and written description to those of US MUTCD. A notable example is that the stop sign which follows the American pattern. The legal description is very similar: "The octagon shall be reserved exclusively for the STOP sign."

CHAPTER SIX

TRAFFIC MARKINGS

6A Introduction and Before 1968

6A1 Introduction: Terms, Classification, Overview

Road markings are not so much as mentioned in the first three international agreements on road safety. These three agreements all had a European cast. (CRICMV 1909, ICRMV 1926, LN 1931 CCURS). The first mention of road markings in such a context is in the 1949 UN Protocol (UN 1949 Protocol, 11-112). In this study road markings before 1952 are considered in Chapter 1. Remarks about road signs, and road signs in international agreements, can not be transferred without a measure of caution, to road markings. That is, signs are an ubiquitous element in traffic safety and though no nation may employ the full gamut of sign types all nations maintain some forms of signs. Road markings are often more recent, more restricted in forms and uses. And a sweeping, global presence is more muted. Even UN 1969 treats road markings at variance with its treatment of signs. For example, illustrations for markings (Annex 8) are clearly stated to be a recommendation in contrast to the status of sign illustrations (UN 1969 CORSS). This greater leeway in the usage and design of markings creates a more uncertain situation in coverage of that topic.

Comments regarding road markings as more modest in scale and significance are not intended to denigrate the value of road markings. With the increasing density of traffic and the increasing cost of road construction, the literally lowly road marking has more and more uses. A

variety of forms of pavement markings have become common, and not merely only the long-established center-line markings. Road markings not only mark existing roads and highways but are capable of creating traffic zones and lanes at low cost thereby improve traffic control effectiveness. While signs may have greater import than road markings the significance of traffic markings, in the totality of traffic control devices, has increased in importance.

A variety of terms are employed for this form of aid. The term Road Markings (along with Road Signals, Road Signs) is commonly employed in Europe (and in documents allied with European practice). Perhaps there is an underlying philosophy in Europe that attaches TCD forms to the road while in the Western Hemispheric practice relates TCD forms to the movement of vehicles (Database Iii 1998). The first and third UN agreements use Road Markings (UN Protocol 1949, 111; UN 1968, 95). A term frequently employed in the Western Hemisphere is that of Traffic Marking. That term -- in tandem with Road Marking -- became the basic term for the Database.

Pavement Markings is also employed as an overarching term. It finds use in UN GERSS and ECAFE (UN GERSS 1952, 28, ECAFE 1964, 15). IAMM (IAMM 1967, 58) includes that term along with other terms. There is an obvious drawback to the term in the fact that it does not readily include object markings which may be above, or off, the actual pavement. Surface Markings also manifests that drawback (ECE 1957, 1); that is also true of Road Surface Markings (ECE 1995, 62; UN 1965, 95). This study includes a variety of terms with traffic markings and road markings as the primary terms. The term Marking alone is yet another term employed in the literature yet it has serious drawback since it competes with the term of

markings in its broader, more inclusive meaning of markings for all safety aids (Database Iii 1998, 145-146; IAMM 1967, 58). Australia addresses the issue by using two terms: Pavement markings, and "Islands and other Devices". The second term includes kerb, hazard, raised pavement markers and other forms. While the practice allows some otherwise hidden forms to surface it also divides a single category into two separate groupings (ACORD 1975, 117, 125). Admittedly, surface and above-surface non-sign markers display differences (and such a description can admit to an awkward construction) but by function they have the same nature.

The 1984 classification in the 1st ed. lacked a variant version and as a result many more specific forms of aids were included in the main classification than now. The three-digit level included longitudinal markings, transverse markings, standing and parking markings, other markings. The classification in Part H (and now in this study) has only two three-digit segments: horizontal markings (which includes the first two groups in the older classification as well as new segments), and vertical markings which includes barricades, channelizing devices, delineators, and object markings. That two-part device will influence this coverage though the practices of UN 1968 will also affect the construction and coverage of this study.

6A2 Traffic Markings 1952-1967

Early Traffic Markings are first considered in Chapter 1 yet that coverage is sparse since they are missing from European systems until the 1949 Protocol. UN GERSS provides a more extensive coverages that includes three forms of traffic markings: longitudinal, transverse and other markings (UN 1952 GERSS, 65-71 TISRP). The first-

named can be subdivided into solid lines with the meaning of “no crossing” (no passing zones in US terminology), broken lines (which are guidance lines and can be crossed when it is safe to do so), and solid/ broken lines in a parallel pattern indicating “no passing” or “no crossing” for the line of traffic bounded by the solid line. Transverse Markings (“Zebra Crossings” in UK usage) provide stop-lines and crossings for pedestrians and cyclists. The section of other markings includes “parking restrictions, turning movements of vehicles and markings indicating physical obstructions in or near the carriageway.” White is the recommended color for pavement markings in the Draft Convention.

European nations produced a document on road markings entitled, *European Agreement on Road Markings* in 1957 through the UN ECE at Geneva. The background of the agreement is not included in the publication though it bears considerable resemblance to UN Protocol 1949. It is a shorter, and a more general treatment than more recent European efforts on road markings (ECE 1957).

IAMM 1967 (1, 58, 59, TISRP) presents a coverage of these aids that is very similar to that of US MUTCD. However confusion is generated by terms in the table of contents: The possibly unique form of Pavement Marks instead of Pavement Markings is employed and this term is joined by the term delineators. However the term in the text is Markings. And within the category of markings are pavement markings, curb markings, object markings and reflector markers (hazard markers and delineators). Delineators is subsumed into a category within the markings coverage though the term and use is at variance with the practice outlined by the table of contents. However, the actual contents follows the logical,

descriptive sequence familiar to North American users.

ECAFE’s usage is similar to that of GERSS in many respects though differences are present. The first article of ECAFE on pavement markings is somewhat at variance with that of the corresponding treatment in GERSS. ECAFE includes descriptions and definitions of pavement markings and introduces a subordinate term: Surface markings (ECAFE 1964, 15-16; 1952 GERSS, 65 TISRP). Coverage of longitudinal lines is similar in meaning, though the word “continuous” is substituted for “solid lines” in GERSS. The treatment of transverse and other markings is similar to that of GERSS except for differences in the format of the ECAFE treatment of the topic. GERSS includes an examination of the matter under the pertinent articles. ECAFE provides general information in several articles and specific coverage in a separate “Section A Detailed Specifications for Uniform Pavement Markings.” There is no “Section B.”

The color yellow for no-passing markings became standardized in US MUTCD for 1961. Previously some states used white while others used yellow. However, the 1961 edition eliminated white for that function. A no-passing line consisted of a solid line on the right of the white center line. A centerline stripe was recommended for all paved roads, as well. Previous editions of MUTCD recommended not using white edge markings but 1961 reversed that recommendation and allowed “permissive use of white edge lines” (Hawkins 1992, 19).

Canada’s work toward a traffic control manual included road markings. Pavement markings were to be yellow for edges of pavements, curbs, parking restrictions and certain other purposes. White was to be employed for

all other situations (Finnbogason 1963, 25-27; also Macnee 1960, 18).

6B UN 1968: Traffic Markings

6B1 Review of Drafts

A review of the Convention drafts (E/3999 to E/Conf. 56/3) on road markings does not reveal an extensive range of changes (UN 1967 DCRSS, 1-26, Annex 8; UN 1969 CORSS, 95-97, 125-146). Some of the changes that did take place include some alterations in the usage of broken lines, and the approval of blue markings for the regulation of parking (UN 1967 DCRSS, 21-23, Annex 8; UN 1969, CORSS, 95-97 TISRP). The newer draft adds a requirement indicating that if yellow and white are both used by a nation, the use of colors must adhere closely to classes of markings associated with those colors. Article 30 and the Annex of illustrations, as previously noted, are recommendations contrary to Articles 25 to 29 on signs which have a mandatory character.

A comparison of E/Conf.56/3 (UN 1967 DCRSS) draft and the final draft, E/Conf.56/17 (UN 1969 CORSS) indicates the two drafts are essentially the same; there are few changes of significance. One change to note is the replacement of the term "road surface markings" with that of carriageway markings (Article 25) (UN 1967, DCRSS, 20; UN 1969, CORSS, 95 TIRSRP). In both drafts a secondary term is provided in parenthesis: "road marking." The journey of road markings from E/3999 to E.Conf.56/3 to the Final Act is remarkably smooth, coherent, constant and notably uniform when contrasted with the journeys that the signs portion of the Convention underwent.

In summary, the less complex road marking process is due to two factors: UN 1968 represented the first extensive treatment of road markings while UN Protocol 1949 considered only three forms of road markings. A long history of a system of road markings did not precede the most recent international conference. Hence, there are no dual-systems or multiple systems of road markings. This is in the sharp contrast with the experience of road signs. The simplicity of markings is also aided by the more limited range of range marking functions. Most markings are some form of painted lines and these lines cover a restricted range of roles.

6B2 UN 1968 Provisions

Traffic Markings approved by UN 1968 include Longitudinal Markings, Transverse Markings and Standing and Parking Regulations (UN 1969, CORSS, 125-130, also 95- 97). The essential characteristics of Traffic Markings include several factors. According to the UN Convention, surface markings are to be of "non-skid material," and this material should not be more than a quarter inch (6mm) above the level of the carriageway (UN 1969, CORSS, 125-126 TISRP). Studs and related devices "should not protrude more than 1.5 cm above the level of the roadway." Reflective markers, when employed, should not be more than 2.5 cm above the surface. These requirements illustrate clearly the horizontal dimension of pavement markings. However, some markings are of a vertical nature, and this may obscure the distinction between signs and reflective markers. This obscurity may be reduced by recalling that signs have graphic and word symbols, and these are generally absent from markings of a vertical nature. However, there are word inscriptions in pavement markings, but they are very much of a horizontal nature.

Longitudinal markings are those continuous and double-lines which vehicles are not to cross (UN 1969, CORSS, 95, 126 TISRP). Broken lines are not prohibitory in character but are rather demarcation lines that guides traffic or either warns that a continuous line is in the immediate vicinity, or that a danger is located further along that portion of the roadway. Longitudinal markings that denote edges of roads, and longitudinal markers conjoined to transverse markings for parking spaces, are considered to be outside of the longitudinal markings category. Longitudinal markings are to be less than four inches in width. When these lines are broken, the line gaps and strokes are to be of equal length. Double lines are to be four to seven inches apart. Broken lines (strokes) "outside of built-up areas" are to be 6.5 inches (2m) to 32' (10m) in length. Strokes in "built-up areas" are to be 3.33 feet (1m).

Traffic lane markings can take one of several forms. On two-way roads outside of built-up areas (and built-up areas for two-way streets and one-way streets with two or more lanes), the centerline is comprised of (in most instances) of a broken line (UN 1969, CORSS, 126-127 TISRP). Three-lane roads are marked by broken lines in some cases, and by continuous lines or a continuous/broken line tandem in yet other instances. Carriageways are separated by one or more continuous lines with broken lines between lanes of each direction. Special considerations are employed where roadways are narrowed by traffic islands and other objects, and at significant intersections. "Continuous Lines for Special Purposes" are frequently applied "where the range of vision is restricted" and on three-lane roads and where "changes in widths of carriageways" are present. Broken lines are recommended for carriagerway limits. This is accomplished with continuous lines and possibly



augmented by reflective devices or "buttons." Obstruction markings are comprised of a series of diagonal lines, often in a rectangular pattern, near islands other than obstructions. "Guide Lines for Turning Vehicles," provide guidance on correct turning procedures. These markings are yellow or white; blue can be employed for parking purposes.

The second category of road markings is that of the transverse markings (UN 1969, CORSS, 128-129 TISRP). These include stop lines, and similar markings at signals and level (railway grade) crossings that run across one or more lines. These lines are wider than longitudinal lines [b]ecause of the angle at which the driver sees markings on the carriageway." Stop lines are eight (0.20m) to twenty-four inches (0.60m) wide with a recommended twelve inches (0.30) for width. A stop line (with accompanying stop sign), so situates motor vehicles that the motorist has clear vision of other motorists at the same intersection. Longitudinal lines and the word Stop may supplement the stop line. Yield lines or "Lines indicating points at which drivers must give way" are eight to twenty-four inches in width. This can be replaced by a series of triangles painted on the ground with the vertices positioned so as to indicate which drives were to yield to opposing traffic. The triangles are to be sixteen to twenty-four inches at base and twenty-four to twenty-eight inches in height.

Pedestrian markings "should be at least equal to the width of the stripes and not more than twice that width ..." (UN 1969, CORSS, 129-130 TISRP). Stripe widths are to be three-feet and four inches to four feet and eight inches (1m to 1.4m). Minimum width is eight feet "on roads on which the speed limit is sixty km/h [37 mph] and 4m [13'] ..." on the faster road or roads without speed limits. Cyclist

crossings are denoted by a double broken line. The line "should preferably be made up of squares" sixteen to twenty-four inches across with an open area between the squares of the same size. The crossing width should be at least six feet. Restrictions for standing and parking can be established on curbs and/or pavement. Parking space limits can be indicated by applying appropriate lines.

Other types of Traffic Markings include a diverse group of aids. Arrows indicate proper lane usage and also aid in delineating traffic direction on one-way streets (UN 1969, CORSS, 129-130 TISRP). Arrows are to be at least six feet and seven inches (2 m). A second form, oblique parallel lines, indicate areas off limits to motor vehicles. These can include median strips and some forms of traffic islands. Word markings can indicate a variety of functions including regulating, warning, and guiding of motorists. The words employed are to be easily understood with letters "elongated in the direction" of traffic movement" The letters need to be eight feet in height for speeds of 30 mph/50 km/h. Obstruction markings can be located on obstacles or adjacent to the roadway. A typical obstacle to mark would be an overpass abutment. Diagonal black lines on a white background would be a typical marking for such an obstruction. (previous source, and Diagram 27).

6B3 Aftermath of UN 1968

The nations of Europe were active in working on road markings after 1968. While UN 1968 did not provide a color code for edge of pavement (or carriageway) markings but the European regulations requires the individual nation to adopt a color or color system for all of the national territory. (UN ECE ECASCRSS 1971, 6; ERCTSS-ECMT 1972, 67 TISRP). The following color

code was adopted: white or yellow for carriageway bollards; white or light yellow for edge markings or white or yellow for edge marking the carriageway "opposite to the direction of traffic;" and red or dark yellow marking the edge of the carriageway "appropriate to the direction of traffic".

The *Protocol on Marking ...* of ECE was promulgated at Geneva in 1971. It presents a substantial series of additions, deletions and revisions of UN 1968 for the European nations that were (or later became) signers to the document. The markings Protocol was prepared after ERCRTSS and is much more extensive than that document. This document, following the format of UN 1968, can be considered in two parts: a preliminary section on the Protocol and related matters, and an "Annex" detailing alterations of the UN publications (UN ECE 1973, PORM 1-11; Annex 1-13).

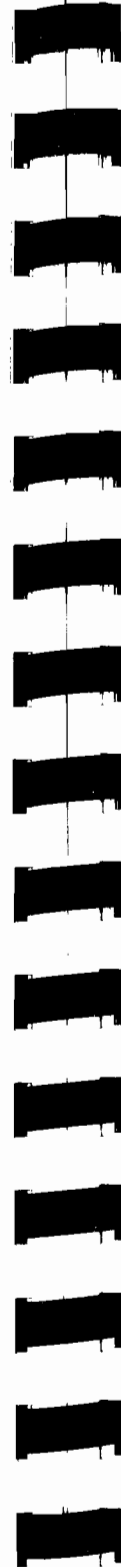
PORM includes two changes in Article 26 of Chapter 4 two changes: "double broken lines for reversible-flow lane [s]" have been added, and a provision that longitudinal-lines for standing or parking prohibitions or restrictions are not to be construed as longitudinal markings (UN ECE 1973, PORM, 1-3 TISRP). Such lines are part of the standing and parking category and are therefore outside of the province of longitudinal markings. There are three changes in Article 27 permits a single line only for stop lines and removes the option of either one or two lines. This Article also restricts the lines adjacent to the "Give Way" sign to one line. Finally, PORM restricts cyclist crossing markings to "broken lines consisting of squares or parallelograms" for those crossings.

PORM adds new paragraphs in Article 28 on the use

of lines (continuous, broken) for prohibiting, and restricting lanes for specific vehicular categories (UN ECE 1973, PORM, 2-3 TIRSP). Colors are also specified for lines in Article 28: blue for parking markings (permitted, restricted), yellow for parking restrictions (by the use of zig-zag lines) and yellow for standing or parking (curb, carriageway lines) both for prohibited and for restricted purposes. Article 29 specifies a single color for parking and parking restrictions rather than present a choice, or optional usage.

Changes in Annex 8 (Chapter II A, “Longitudinal Markings”) introduces several changes including a requirement that broken lines be at least double for specified cases (UN ECE 1973, PORM, 4 TIRSP). This Chapter also reduces the size of strokes for lines in Article 26 (2 (a) (i) with the adjoining gaps to be two to four times larger than the strokes. The second segment of 2 (a) requires the strokes to be two to four times greater than the gaps. A new paragraph, replacing Paragraph 6 of UN 1968, requires continuous lines to be at least 65 feet (30 m) in length.

PORM removed references to “outside built-up areas” and “in-built areas” (“Traffic Lane Markings” in Chapter II B (UN ECE 1973, PORM, 4-6 TIRSP). These had provided sub-divisions within the chapter. This chapter also replaces UN 1968 reference to “two lanes” with “three lanes ... on two- way streets” in reference to “Oblique parallel lines.” Treatment of special marking formulations is also increased. And, finally, reference to the specific form of longitudinal markings for two-lanes two-way carriageways is dropped. Double lines for road with more than three lanes is restricted in the European usage. Single continuous lines are “to be wider than the lane-lines on the



same section of road” is a new stipulation that is added. A “double warning line” is permitted for “each edge of the reversible lane [s]” according to the a new requirement. References to illustrations of the marking of one-way road [s] and of the carriageway of a motorway” are added. The PORM system of numbers and letters replaces those of UN 1968; this is true of several paragraphs of the PORM document.

“Marking for particular situations,” encompasses a series of specialized changes for PORM (Chapter II C) (UN ECE 1973, PORM, 4-9). These include defining “range of vision” and an amalgamation of adjoining paragraphs in UN 1968 into Paragraph 17 of PORM. Paragraph 18 reworks UN material and concentrates on gaining the maximum use of three-lane roads through the medium of pavement markings so as to reduce 3-lane roads to 2-lanes or through the assigning of two lanes for one- direction of traffic. Some paragraphs were deemed superfluous for European usage. And finally, Paragraph 22, on the changing the width of a carriageway, refers to speeds of 60 km rather than the 50 km of UN 1968. Paragraph 23 of the same chapter underwent serious revision. This part of the document provides a “warning line” for preceeding continuous lines. This warning line is to be 333’ (110 m) in for higher speed zones and 151’ 50 m) in zones with speeds no more than 60 km/h. “Deflecting arrows” are appended as a supplement to the warning lines.

Paragraph 26 (Chapter II D), “Border lines indicating the limits of the carriageway,” specifies a width for border lines: minimum width is to be 0.10m or 4” and 0.15m or 6” for “motorway or similar road [s] (UN ECE 1973, PORM, 9 TISRP). Paragraph 28 of Chapter II F, “Guide lines and arrows at intersection,” expands the UN text by specifying

the use of guide lines for left-turns (in right-hand nations) and right-turns (in left-hand nations).

PORM adds a variety of changes for Transverse Markings (Chapter III). Paragraph 32 of Chapter III B, "Stop lines," is shortened (UN ECE 1973, PORM, 10-12 TIRSP). Paragraph 33 of Chapter III C, "Line indicating points at which drivers must give way," are to be one-line only; two-lines are not permitted though triangles are an acceptable alternative. Paragraph 35 drops specific mathematical formulations for triangles. Paragraph 37 of III D, "Pedestrian crossings," alters the UN coverage by reducing the minimum width of stripes and spaces for pedestrian crossings. It recommends traffic signals for crossings on high speed roadways. Paragraph III E, "Cyclists crossings," provides for a 3m or 9' 9" width for "two-way cycle tracks" and permits parallelogram for oblique crossings.

Chapter IV, "Other Markings" contains a variety of changes after work by PORM. Paragraph 39, in Chapter IV A, "Lane-selection arrow markings," clarifies the use of arrows by naming them as "lane selection arrows" (UN ECE 1973, PORM, 12-13). Paragraph 40 (Chapter IV B), "Oblique parallel lines," is greatly expanded. Additional attention is given to the use of chevron markings. Two paragraphs of UN 1968 are consolidated for European usage and substantially revised: sizes for letters for speeds over 50 km/h now apply to speeds over 60 km/h, and a new size of letter is prescribed for speeds up to 60 km/h (1.6m or 5' 4"). Paragraph 46 of Chapter IV E, "Marking of obstructions," provides color formats for obstruction markings. These are to be either black and white or black and yellow.

Corrigendum 1 of PORM replaces diagrams A-1 and A-46 with revised versions of those diagrams (UN ECE 1973, PORM, Corr. 1). The first-named concerns longitudinal markings, and the second-named refers to "Examples of word markings with speed limits of 60 km/h or less."

The US MUTCD continued to exhibit more extensive and sophisticated road markings than those of the UN. Nonetheless, the US continued improvements in markings (Shoaf 1971, 63; US MUTCD 1971, 178-186). These changes included changing the color of centerline markings from white to yellow, revising markings for no passing lanes and for lane separation lanes. The 1978 edition called for edge lines in white for the right edge of roadways, and yellow for the left edge. Barricades and channelizing were moved from construction to markings portion of MUTCD (Hawkins 11-1992, 19).

APPENDIX I

GLOSSARY OF TERMS

This Glossary does not attempt to offer a complete and definitive listing of necessary terms. Rather, it endeavors to provide an operational set of terms that will clarify the meaning of special words in the monograph. Several terms are included from *Foundations*, Part A that may help to explain concepts and ideas referred to in this study. The definitions may not manifest completeness or etymological purity. They do, hopefully, provide basic definitions and descriptions. Some entries are less definitions than translations of foreign terms or English language terms not familiar to American and other readers more conversant with "American system" than Protocol concepts. Only a few are direct quotes; most entries are distillations of definitions and descriptions based on a variety of sources.

The Glossary is divided into five segments:

- i. Classification system numbers terms
- ii. Message characteristics terms
- iii. Marking types terms
- iv. Transportation terms
- v. Political terms

i. Classification Systems Terms

The great number of terms employed in Part E (and the intermingling of terms among various phenomena requires a kind of charting of taxonomic terms and their corresponding meanings. Entries include more general-use terms as well as those with more specific significance for Traffic Control Devices.

DIVISION. A term only rarely employed in this study. It refers only to the "family" number (first digit) in the classification system. The divisions and numbers are:

- marine aids to navigation
(floating) -1
(fixed) -2
- aeronautical nav aids -3
- traffic control devices -4
- railway signals, signs -5

SUB-DIVISION. This refers to the nature of message/family or mode numbers (first and second digit). For example, 41 refers to a TCD traffic signal (4 for TCD and 1 for all-lighted).

CATEGORY. Three-digit numbers are referred to by Category. For example, 411 refers to a TCD signal of the full or traffic variety.

SUB-CATEGORY. This term refers to the special situation in which markings are sub-divided at the four-digit number level rather than at the three-digit-number level. For example, Can and Nun Buoys (*International Marine Aids to Navigation*, Parts C/D) are bifurcated at the three-digit level, but traffic signs are very prolific which requires a further sub-division at the four-digit level.

TYPE. Type refers to individual markings and certain categories of markings and is designated by the four-digit number. For example, Pedestrian Signals, 4111; Lighting Devices, 4112.

ISOLATE. A special term for a marking that is of a singular character with no variations whatever.

PART. This is also a special use term. It denotes a distinction within a given two-digit number area. For example, it is necessary to separate traffic signs from traffic signs within the unlighted area of TCD forms. 431-433 designates signs while 434-435 indicates traffic markings.

ii Message Characteristics Terms

SIGN. This term denotes that phenomena that serves as a representation of some other object; for example, an illustrations of falling rocks that indicates the presence of a nearby cliff littered with loose and potentially hazardous rocks. Sign, in this sense, is semiotical and encompasses all forms of Traffic Control Devices. Signs, in a more restricted sense, exhibits a symbol (color, shape, graphic representation, word message) and projects a single message though varying symbols may be used to effect that message.

MODEL. In UN parlance model refers primarily to the shape of signs. Two models of the “Stop” sign are available (Protocol and American) and two models of Danger Warning signs (again, Protocol and American) are available. Of course, the intent of the respective signs does not vary because of model difference (UN 1968, CORSS, 109).

SYMBOL. For the UN a symbol is the graphic representation on a sign. While seemingly the color of the symbol is part of the symbol the other factors (shape, color of ground, rim and so forth) are not. Neither are word symbols (termed “word inscriptions”) included under the appellation “symbol.” The US follows suit in excluding

word messages from the category of symbol. A broader notion would include all aspects of the sign, including the sign post, as a genuine symbol (UN 1968, CORSS, 109; see also US 1961 MUTCD).

GROUP. In this study “Group” refers to a narrow span of signs which are closely related; for example, the direction signs of UN 1968.

RANGE. For this monograph “Range” will refer to a broad category of signs; for example, warning or guide signs.

VARIANT. An informal synonym for symbol or model, and for other situations in which a nuanced distinction between signs is needed.

FORM. The specific representation that a sign exhibits, and that distinguishes one sign from an adjoining sign.

GROUND. This refers to the dominant color of a sign. US MUTCD employs BACKGROUND instead though the meaning remains the same. Other colors and graphic and/or alphanumeric symbols are placed over the ground color.

BORDER. A stripe of paint or other substance located at or near the edge of a traffic sign. US, Canada, GERSS and UN 1949 all employ this term. UN 1968 uses RIM instead. The two terms have approximately the same meaning. UN 1968 refers to the rim or border of the American warning sign as a “narrow rim.” This would suggest a nuanced distinction between rims as a wider stripe or edge, and border as a more slender variant. UN signs of the “European system” have broader edging than warning signs

and the "Stop" sign of the American variety. US practice notes that dark borders are set within the edge of the sign while lighter borders extend to the edge of the sign. The US refers to the very broad border of the "Yield" sign as a BORDER BAND.

PANEL. This term can legitimately refer to the metal, wood, or other surface of all signs. But it would appear to have a more restricted usage referring to surfaces containing no word or graphic symbol (save painted or taped striping), and for supplemental signs attached to some standard signs. The US, for example, makes use of barricades comprised of horizontal or vertical materials which are termed panels. The UN employs similar substances to signs for level-crossings. PLATE in some national usage appears to be identical in meaning to supplemental signs or panels. Canadian TABS are yet an additional example of the notion though under a different appellation.

iii Types of Marking Terms

SIGNAL. A Transportation-Marking that produces a lighted message of a changing character (for example, proceed, stop, caution). At least one major language, that of French, does not have separate words for sign and signal: Unlighted signs are SIGNAUX while Lighted signals are termed SIGNAUX LUMINEUX. The word traffic is usually added to the word signal to denote signals intended for full control situations at intersections.

TRAFFIC BEACON. US and selected other nations have employed this term and it forms an interconnecting unit with Traffic Signals and Traffic Markings. It designates a signal with a continuously flashing light in contrast with a fixed and alternating light. The message does not vary

whether it a caution message, or a stop and proceed message. FLASHING BEACON has replaced Traffic Beacon in more recent editions of MUTCD. Though Traffic Beacon remains a key term.

SIGN. A non-powered Transportation-Marking with a message based on graphic, word and other symbols. It is usually a vertical unit as opposed to the normally horizontal dimensions of pavement markings.

TRAFFIC CONTROL DEVICES. A term employed by a variety of nations including the US. However, it is not a UN-sanctioned term. Canada attempted to have the phrase (abbreviated as TCD) entered into the UN 1968 documents, but this proposal was not approved (though the term is found in road traffic documentation of UN 1968). An umbrella term for Traffic Control Devices is apparently not available in non-English languages unless the French term SIGNALIZATION qualifies.

PAVEMENT MARKINGS/TRAFFIC MARKINGS/ROAD MARKINGS/CARRIAGEWAY MARKINGS/ROAD SURFACE MARKINGS. There are numerous terms for this form of safety aid. Traffic Marking has considerable merit since it can form a troika with Traffic Signals and Traffic Signs. However, that term is not overwhelmingly employed. UN 1968 and the International Municipal Signal Association employ the term Road Marking and that term thereby becomes a major term in the category. In the US and other nations the term Pavement Markings is frequently employed though it is not fully adequate. It is possibly that Pavement Markings manifests a somewhat loose definition that allows inclusion of objects in or near roadways. But the term does not satisfactorily include a variety of devices that are commonly seen as a

part of non-sign markings. Since there is no fully-acceptable umbrella term for this group of safety aids this has led to a multiplicity of terms for this group of safety aids. These terms are also marked by contradictions in and among the various terms. The contents for this form of traffic control device includes all lines, patterns, words, colors and other devices -- except signs -- set into the surface, applied upon, attached to the pavement, curbs, or objects in or near the roadway.

INFORMATIVE SIGNS. US and selected other nations employ **GUIDE SIGNS**. These signs provide route, destination and scenic points information.

DANGER WARNING SIGNS. **WARNING SIGN** is also employed by the US and other nations. **DANGER SIGN** is an added alternative form. This form of sign marks present or potential hazards.

REGULATORY SIGNS. Highway and road regulations are projected through this type of sign.

SIGNAGE. According to Charles McLendon (author and semiotics consultant) “[i]t is one single word which we believe succinctly describes any aggregation of signs that effectively meets user requirements” (Letter to writer, Feb. 10, 1983). It may not be found in the full range of standard dictionaries but it provides resonance with more established terms such as buoyage and beaconage.

iv Transportation Terms

MOTORWAY. This term is the approximate equivalent of Limited Access Highways in the US. This term and most other terms in section iv are from UN 1968).

LEVEL-CROSSING. UN and European System employ this term in contrast to **RAILWAY CROSSING** or **GRADE CROSSING** employed in a variety of nations including the US.

ROUNDABOUT. A British term for **TRAFFIC CIRCLE** or **ROTARY**. It is an oval or round intersection with a one-way traffic flow in which vehicles can enter or leave at conjoined roads without interfering with the flow of traffic.

PRIORITY ROAD. Major road systems with special signage at the beginning and ending of roads designated as priority. This type of road and accompanying are often associated with the European system.

BUILT-UP AREA. Again, a special designation area with accompanying signs. And more associated with European arrangements than in other areas.

BOLLARD. A metal or wood post in or near the roadway that requires special markings, or is the foundation of such markings.

CARRIAGEWAY. A UN term for one or more traffic lanes which form a unit and are separated from other lanes by dividers or other barriers.

v. Political Terms

CONVENTION. This is equivalent to the term “Treaty.” Convention usually has reference to technical or social matters while treaty refers to political concerns. Conventions exist between independent states and are

subject to international laws.

PROTOCOL. This refers to a document that is added onto a treaty or convention and which contains technical material. The UN Convention was a brief, general document while the Protocol was the actual sign, signal, and markings document.

176

APPENDIX II
A COMPARATIVE REVIEW OF
INTERNATIONAL ROAD SIGNS 1909-1968

i Introduction

An examination of traffic signs on a case-by-case study of signs in various international agreements can be a workable method of study. But such an approach, even when detailed, fails to illumine the interactions and inter-relationships of road signs in the 20th century. Road signs do not remain -- and often do not begin -- within the boundaries of one international agreement or system of signs. Rather, the life span of road signs has an organic quality which spreads beyond a single agreement, nation or region. Signs influence and affect other systems of signs and other concepts of safety.

An adequate understanding of the development of signs requires an approach to signs that includes inter-connections. Therefore, the chapter-by-chapter examination of signs in this monograph does not provide a complete notion of traffic signs. International agreements on signs, studies of the types of signs, review of the kinds of messages lacks an integrating element and this can lead to confusion and misconceptions. Hopefully, the accompanying chart of this Appendix will provide that needed integration. The chart outlines signs according to systems, agreements and classifications of signs beginning with the first decade of the 20th century and ending with the 1968 UN Conference. Divergencies found among signs will admittedly make an appearance in the chart as well. This results in an awkwardness and ungainlessness that cannot be entirely avoided. Harmonization of sources would blur distinctiveness and prove to be a very mixed blessing

177

indeed.

Preparation of the chart has been made more difficult by the titles of various subdivisions of signs that are not always in agreement. However, there is a substantial agreement among the specific types of signs within the various systems. It therefore remains possible to arrange the signs in logical patterns despite those differences in titles and sub-titles of sign categories.

It has not proven feasible to include all of the systems of signs on the chart. Including more systems would not only have cluttered the chart but also obscured the attempted comparison of signs. In the 1st ed a two-fold criteria was used to determine which systems to include: 1) whether or not a traffic control devices has had widespread usage; 2) whether or not a system has had considerable influence on signage in other nations and regions. Canada was not included though a case could be made to include it in on the basis of two factors: innovative ideas (for example, annular rings), and organization of signs.

The CASATC system of 1950 fulfills the first criteria. CASATC was based on sign concepts from other regions and CASATC, in turn, was not only employed in a variety of African nations but also influenced more contemporary systems beyond Africa (References are not included in this Appendix since the reviewed topics are an extension of subject matters explained in detail elsewhere). An example of the second criteria can be found in the "American system" stop sign and danger warning signs. These signs have been adopted by nations in the Western Hemisphere and increasingly on a global scale. A system included in the chart may qualify under both criteria.

There are been two very prominent "streams" or "currents" of signs systems: the "European system" and the "American system." As noted in the monograph, there are one or possibly two additional strains: OBS (reflected in CASATC) and GERSS (encompassing dimensions of the other systems). However, the first-named have a pre-eminent role in sign systems especially here. The European system began on a limited basis in 1909, expanded in 1926 and again in 1931. Further change in the system occurred in 1938 and 1939 though that effort remained incomplete until UN Protocol 1949. Since the interwoven triad (09-26-31) underlays the recognizable "European system" of later years, these are included in a combined column in the chart. LN 1938-1939 represents an intermediate situation which requires separate treatment. The 1949 UN Protocol is an extension and expansion of earlier efforts. It failed to achieve the hoped-for international official validation though it continues and develops the European system and has significance; it is therefore included in the chart.

The "American system," a less cohesive and comprehensive endeavor, influenced many Western Hemisphere systems as well as the 1952 UN GERSS draft. US signs, as found in the 1961 MUTCD, are included in the chart. The 1961 edition is utilized since it was in force during the time of preparation of the first edition of the *Inter-American Manual* and the UN 1968 Conference. A case might be made for inclusion of the 1948 edition of MUTCD since it formed one base of the GERSS effort. However, space limitations prevent adding that edition. Key signs of the 1948 MUTCD are much the same as in 1961 (especially the stop sign, and danger warning signs).

CASATC of 1950, though of more limited applications, has a three-fold significance: GERSS 1952

includes CASATC as a leg of its triadic foundation; it was employed in traffic signs of Africa; and it extended and expanded usage of the “Old British System”. In addition, the dual-plate or supplementary plate concept of OBS--CASATC continues on in the 1968 UN system as an official option. It is an obvious choice for inclusion in the chart.

UN GERSS 1952 represents a milestone in TCD systems as it brought together the best features of major previous approaches. It never received international approval but it has been utilized by several sign agencies. GERSS has influenced later regional and international efforts including that of the Pan-American Highway Congresses (*Inter-American Manual*) and the TCD manual of ECAFE.

The titles of divisions of signs, as previously mentioned, can be a source of confusion. An index of the title variations is included which may help to reduce some of the confusion. Danger or Warning signs were termed “Danger signs” from 1909 to 1949, inclusive, for European agreements; these became “Danger Warning signs” in 1968. US MUTCD and IAMM describes the same signs as “Warning signs”. CASATC and GERSS both employed “Danger Warning signs”.

The phrase, “Informative signs” is used both in the 1950 CASATC and 1952 UN GERSS documents. A more cumbersome title, “Signs Giving Indications Only” describes the same type of sign in 1931. LN 1939 and UN 1949 splits information signs into “Informative Signs Other Than Parking” and “Signs Providing Useful Information on Parking.” US and IAMM publications use the term “Guide Signs” instead of Informative Signs.”

Regulatory signs, because of the various subcategories, offers additional variants:

- 1931 -- main heading: Signs Giving Definite Information
-- sub headings: Signs Prohibiting Passage
Signs Indicating an Obligation
- 1939 LN -- main heading: Prohibitory or Mandatory
-- sub headings: Prohibitory
Mandatory
- 1949 UN -- main heading: Signs Giving Definite Instructions
-- sub headings: Prohibitory
Mandatory
- 1950 CASATC -- unified heading: Prohibitory and Mandatory
- 1952 GERSS (and 1961) US -- single heading: Regulatory
- 1968 UN -- main heading: Regulatory Signs Other Than Standing and Parking
-- sub headings: Prohibitive or Restrictive

Mandatory

Priority

-- special heading: Standing and
Parking Signs

Explanatory Notes follow the Chart. They provide information on nuances and various complex matters not found in the Chart. The Explanatory Notes also supply a key to abbreviations in the Chart.

ii The Chart

Warning Signs

1909-26-31

1939

Uneven Road 09/31
Gutter Road 26
Sharp Turn 09/31
Bend 26
Cross-Road 09/26/31
Level Crossing 09
L-C w. Barrier 26
L-C Guarded 31
L-C Unguarded 26/31
Alternative 31
Hollow 26
Other Dangers 31

Uneven Road
Sharp Turn
Single Bend to L, R
Double Bend
to L, R
Cross-Road
Road End in
Junction w.
Another Road



Cross-Road
Road End. in
Junction w.
Another Road
Road in Which
Another Road
Ends at a
Junction
Level-Crossing
w/w.o Gates
Approach to a
School Entrance
Other Dangers
General Danger
Approach to a
Major Road
Stop (Hall)

1949

Uneven Road
Dangerous Bend (s)
Gen., R, L, DRL,
DLR
Road Intersection
Level-Crossing w/w.o
Gates
L-C in the Immediate
Vicinity
Dangerous Hill
Carriageway Narrows
Opening Bridge
Road Works
Slippery Carriageway
Pedestrian Crossing

Children
Beware of Animals
Intersection w. a
Non-Priority Road
Other Dangers
Priority Road
Ahead
Cross-Road

1950

Crossroads
Gate or Level
Crossing Barrier
Cross-drain or Dip
Gate & Motor Gate
L, R
Motor Gate
Unguarded Level-
Crossing
Level-Crossing
Warning Cross
Level-Crossing
Stop
Dangerous Curve
Dangerous
Junction
Narrow Bridge
Dangerous Fork
C-LC, C-RC,
LC-RC
Danger
Dangerous
T-Junction

Dangerous Sharp
Turn, R
Dangerous Steep
Descent to L, R
Road Narrows
Dangerously
Traffic Circle, L, R
Dangerous Reverse
Bend Winding
to R, L
Children
Overhead Bridge

1952

Dangerous Curves
Sh, R, L, Dbl
Road Intersections
Cr Rd, L, R, T, Y
Intersection with a
Minor Rd, or Non-
Priority Road
Cr Rd, L, R, T, Y
Stop Sign Ahead
Priority Road Ahead
Uneven Road
Bump
Dip
Rough Road
Dangerous Hill:
Dangerous Descent
Dangerous Ascent
Road Narrows
Narrow Bridge
Opening Bridge

Road Works
Slippery Road
Pedestrian
Crossing
Children
Beware of
Animals
Low Clearance
Narrow Clearance
Level-Crossing
Level-Crossing
Guarded by Gates

1961 US

Turn
Curve
Reverse Turn
Reverse Curve
Winding Road
Large Arrow,
L, R, Dbl
Cross Road
Side Road, L or R;
45 or 90 degrees
"T" Symbol
"Y" Symbol
Stop Ahead
Yield Ahead
Signal Ahead
Merging Traffic
Pavement-width
Transition
Narrow Bridge
One-lane Bridge



Divided Highway
Divided Highway Ends
Hill
Bump
Dip Pavement Ends
Soft Shoulder
Slippery When Wet
School
School Crossing
Railroad Advance
Warning
Railroad Cross-
buck
Crossing Signs:
Cross walk, Deer,
Truck, Pedestrian,
Cattle
Double Arrow
Low Clearance
Advisory Speed
Plate
Advisory Exit Speed
Traffic Signal
Speed
Miscellaneous
Warning Signs

1968 UN

Dangerous Bends,
L, R, DBLR, DBLL
Dangerous Descent
Steep Ascent
Carriageway Narrows
Swing Bridge

Road Leads Onto
Quay or River
Bank
Uneven Road
Slippery Road
Loose Gravel
Falling Rocks
Pedestrian
Crossing
Children
Cyclists Enter-
ing or Crossing
Cattle or Other
Animal Cross-
ing: Wild,
Domestic
Road Works
Light Signals
Airfield
Cross-wind
Two-way Traffic
Other Dangers
Cross-roads
Stop Sign Ahead
Yield Sign
Level Crossing
w/w.o. Gates
Tramway Inter-
section
Level Crossing
Immediate
Vicinity
Level Crossing-
Additional Panels

Informative Signs

1931

Signs Giving
Indications Only

Authorized Parking
Place

Caution

First-Aid Station
Place

Direction

1939 LN

Caution Signs
Or Indication Signs

Caution Signs

Caution

Approach to a
School Entrance

Indication Signs

Authorized Parking-
Place

First-Aid Station
Place

Direction

Advance Direction

1949 UN

Indication Signs

Parking
Hospital

First-Aid Station

Mechanical Help

Telephone

Filling Station

Priority Road

End of Priority

Advance Direction &

Direction Signs

Place and Route

Indirection Signs

1950 CASATC

Curve

Fork, L & R-C, LC/C

Junction

Sharp Turning To L, R

Steep Winding

Descent, L, R

Road Narrows

“T” Junction

Hospital

First Aid

General

Pedestrian Crossing

Telephone

Filling Station

Service Station

Loading Zone

Rank for Taxis

Parking

Bus Stop

Tram Stop

Second Stage

Major Road Ahead

Advance Direction &

Direction Signs

Place and Route

Identification Signs

Direction

Place Names

Descriptive

Route Markers

1952 GERSS

Advance Direction Signs

Direction Signs

Route Markers

Signs Giving General

Information

1961 US

Guide Signs

Route Markers &

Auxiliary Markers

Route Markers

Auxiliary Route

Markers

Confirming &

Reassurance

Route Markers

Junction Marker

Combination Junction

Advance Turn Arrow

Directional Arrow

Directional Assemblies

Alternative Route

Markers

By-Pass Marker

Business Route Marker

Detour Marker

Detour Arrow Sign

Cardinal Direction

Marker

Trailblazers

Distance & Destination

Signs

Destination

Distance

Street Names

Expressway

Directional

Gore

Exit Direction

One-mile Advance

Two-mile Advance

Next Exit

Informative Signs

Rest & Information

Service

Next Services

Parking Area

Mile Posts

Information

1968 UN

Informative Signs Other

Than Parking Signs

Advance Direction Signs

Direction Signs

Place Identification Signs

Confirmatory Signs
Pedestrian Crossing Signs
Other Signs Providing Useful
Information for Drivers of
Vehicles:

Hospital,
One-way Road
No Through Road
Road for Motor Vehicles
Tramway Stop
Road Open or Close-
with Panels

Signs Giving Notice of
Facilities Which May Be
Useful to Road Users:

First-Aid
Miscellaneous

Signs Prohibiting or
Restricting Standing or
Parking

Parking Prohibited
Standing & Parking
Parking
Alternative Parking
Limited Duration &
Parking Zone

Signs Providing Useful
Information on Parking

Regulatory Signs

1931

Signs Giving Definite Instructions

Signs Prohibiting Passage

Closed to all Vehicles
One-way Road or Entry
Prohibited

Passage of Certain Classes of
Vehicles Prohibited:

Motor Vehicles Prohibited
Motor Cycles Prohibited
All Vehicles Prohibited

Weight-limit

MV Weight Over 5.5 Tons

Maximum Speed

Waiting Prohibited

Parking Prohibited

Signs Indicating An Obligation

Direction to be Followed
Stop Near Custom-house

1939

Prohibitory or Mandatory Signs

Prohibitory Signs

Closed to all Vehicles
One-way Road or Entry
Prohibited

MV Prohibited

MC Prohibited

MV (MV, MC) Prohibited

Pedal Cycles Prohibited

Weight-Limit

Maximum Width of Vehicles
Maximum Height of Vehicles
Speed Limit
Stop Near Customs Officer
Waiting Prohibited
Stopping Prohibited

Mandatory Signs

Direction to be Taken
Road to be Taken by Cycles
De-restrictions or the Removal ...

1949 UN

Signs Giving Definite Instructions

Prohibitory

Closed to all Vehicles in
Both Directions
No Entry for All Vehicles
Turning to the R or L
Prohibited
Overtaking Prohibited
No Entry for All MV except
MC w/o Sidecars
No Entry for all MV
No Entry for Goods Carrying
Vehicle Exceeding ... Tons
Laden Weight
No Entry for Pedal Cyclists
No Entry for Vehicles Having
Overall Width Exceeding ...
Metres (... feet)
One-way
No Entry for Vehicles Having
An Axle Weight Exceeding ... Tons

Speed Limit
End of Speed-Limit
No Entry for Vehicles Having
 Overall Height Exceeding
 ... Metres (... feet)
No Entry for Vehicles
 Exceeding ... Tons
 Laden Weight
Stop at Intersections
Stop (Customs)
Restricted Stopping or
 Waiting
Waiting on Alternate Sides

Mandatory

Direction to be Followed
Compulsory Cycle Track
Compulsory Minimum Speed

1950 CASATC

Prohibitory & Mandatory Signs

Restriction Notice
No Overtaking
Speed Limit
Stop
Speed Limit Restriction
De-restriction Notice
Level Crossing Stop
No Parking
Stop-signal for
 Scholar Patrol
Compulsory Cycle Track

No Stopping

1952 UN GERSS

Stop

Direction Prohibited

Turning to the R, L
Prohibited

About-turn (U-Turn)
Prohibited

Overtaking Prohibited

No Entry for Vehicles
Having an Overall Width
Exceeding ... Metres
(... feet)

No Entry for Vehicles
Having an Overall Height
Exceeding ... Metres
(... feet)

No Entry for Vehicles
Exceeding ... Tons
Laden Weight

Speed Limit

Direction to be Followed

Restricted Parking

Parking Prohibited

No Entry for Goods-
Carrying Vehicles

No Entry for MV

No Entry for Bicycles

Horn Blowing Prohibited

1961 US

Stop

Yield

Speed Limit

Special Speed Limit

Night Speed Limit

Minimum Speed
Limit

Speed Zone Ahead

End ... Mile Speed

Turn Prohibited,
R, L, All, U

Lane-use Control

Signs at
Intersections

Do Not Pass

Pass with Care

Slower Traffic Keep
Right

Trucks Use Right
Lane

Truck Lane ... Feet

Keep Right

Do Not Enter

No Trucks

Trucks Excluded

Commercial Vehicles
Excluded

Pedestrians
Prohibited

One-way

Two-way Traffic Ahead

End-One Way

Parking & Stopping

No Parking on Pavement

No Parking Except on
Shoulder

Use of Audible Warning
Devices Prohibited

End of all Local
Prohibitions

End of Speed Limit

End of Prohibition on
Overtaking

Passing w/w.o. Stopping
Prohibited (Customs)

Mandatory Signs

Direction to be Followed

Pass This Side

Compulsory Roundabout

Compulsory Cycle Track

Compulsory Foot Path

Compulsory Track for
Riders on Horseback

Compulsory Minimum
Speed

End of Compulsory
Minimum Speed

Snow Chains Compulsory

Standing & Parkings Signs

Parking Prohibited

Standing & Parking
Prohibited

Alternate Parking

Limited Duration Parking
Zone

Walk on Left
Pedestrian Crossing
Keep Off Median
Road Closed ...
Miles Ahead
Local Traffic Only
Weight Limit

1968 UN
Regulatory Signs Other Than
Standing & Parking

Priority Signs
Give Way
Stop
Priority of Road
End of Priority
Priority for Oncoming
Traffic
Priority over Oncoming
Traffic
Prohibitive or Restrictive
No Entry
Closed to all Vehicles
in Both Directions
No Entry for ...
Driving of Vehicles Less
Than ... Metres (... Yards)
Apart Prohibited
No R, (L) Turn
No U-Turns
Overtaking Prohibited
Overtaking by Goods
Vehicles Prohibited
Maximum Speed Limits

iii Explanatory Notes

Abbreviations for the Chart include:

w/wo= with, without
L-C= Level-crossing
L= Left
R= Right
Junct. = Junction
DRL= Double Bend, Right
then Left
DLR= Double Bend, Left
then Right
Gen.= General
C-LC= Center and Left of
Center
C-RC= Center and Right
of Center
Cr.rd= Crossroads
“T”= “T” shaped junction
or intersection
“Y”= “Y” shaped junction
or intersection
Gd.= Guarded or Guard
Trk= Truck (keep?)
Ped.= Pedestrian
“U”= “U” Turns
MV= Motor Vehicle
MC= Motor Cycle
Max= Maximum
Mkr= Marker
R.Mkr= Route Marker
L & R-C= Left and Right of Center
LC/C= Left of Center and Center

Warning Signs, 1909-26-31: "Gutter" and "Uneven Road" are different names for the same symbol. "Bend" and "Sharp Turn" also represent different names for the same symbol. The same factor is true of "Level-crossing 09," "L-C Barrier 26," and "L-C Gd. 31." "Alternate" and "Hollow" signs are additional examples of identical graphic symbols with different word titles.

Warning Signs, 1939: The Level-crossing designation contains two signs: one with gates, one with a locomotive denoting no gates. The "General Danger" sign is the "Hollow" sign of former agreements. The "Approach to School Entrance" sign has two versions: one with a stationary figure, one with a running figure. "Major Road" sign has a fuller title: "Sign warning drivers of their approach to a road ranking as a major road in relation to that on which they are travelling or a road having priority of passage." The complete title for the "Halt sign" is, "Sign ordering drivers to halt before entering a road ranking as a major road in relation to that on which they are travelling or a road having priority of passage."

Warning Signs, 1949: The "General" designation for "Dangerous Bend" signs was supplied by the compiler. The sign is employed when national road agencies elect not to use a more precise type of indication for hazards. The "Road Intersection" sign is found at road junctions, cross-roads and forks. Intersections which contain a roundabout can be marked by an intersection sign exhibiting a roundabout symbol. "Level-crossing signs-immediate vicinity" refers to the vicinity of the track. They are marked by a sign in the form of a Saint Andrew's Cross."

Warning Signs, 1950: The "Dangerous Fork" sign is

illustrated in C-LC and LC-RC versions; presumably a C-RC is also a possibility.

Warning Signs, 1952: The symbols for "Road Intersections" and "Intersections with a Minor Road" are the same sign except that the Minor Road version exhibits a narrow road intersecting with the major road. The former sign exhibits roads of the same width.

Warning Signs, 1961: "Crossing signs" are not a complete list but instead are those listed as possible types in MUTCD. That publication also presents possible warning signs of a miscellaneous nature but these are not in the chart.

Warning Signs, 1968: "Cross-road," "Stop Sign Ahead" and "Yield Sign Ahead" are titles not found in UNCORT. The signs in question are described in the "Danger Warning Signs at Approaches to Intersections" part of the second Annex but no titles as such are given. The sign titles attached to those signs are in alignment with those of other sign systems in which the titles are supplied.

Regulatory Signs, 1931: "All MV" means all MV are prohibited: The symbol indicates autos and motorcycles though seemingly trucks are included. The sign that indicates "MV over 5.5 tons" presumably gives that figure as an example only; later agreements which employ that figure use it as an example not as an actual sign.

Regulatory Signs, 1939: "MV prohibition" has the same symbol as the "All MV" of 1931. "Pedal cycles" means bicycles in American terms. The "5.5 tons sign" becomes "Weight Limit" sign. "Waiting Prohibited" includes signs for general prohibition and selected

prohibition (for example, “No Parking on this side on even days”). The “De-restriction sign” has the full title of “Sign indicating de-restrictions or the removal of a prohibition imposed by a previous sign.”

Regulatory Signs, 1949: Explanatory Notes did not seem necessary for this category and system.

Regulatory Signs, 1950: Parking signs included both general-use and limited-use forms.

Regulatory Signs, 1952: Explanatory Notes did not seem necessary for this category and system.

Regulatory Signs, 1961: “Special Speed Limits” signs includes those for trucks and for freeway exits. “All” means “No Turns” permissible. “Lane-use Control” signs refer to a variety of signs which exhibit instructions for individual lanes. “Trucks Excluded,” “No Trucks,” and “Commercial Vehicles Excluded” are all examples of the “Selective Exclusion Signs” segment, and therefore are not standardized signs. Parking and stopping signs include several versions; these signs are seemingly for urban situations. The two “No Parking ...” signs are for rural usage. “Pedestrian Crossings” include several different signs.

Regulatory Signs, 1968: The “Overtaking” sign includes a general sign and a second version for goods-vehicles. “No Entry For ...” are those signs for specific categories of exclusion; there are ten such signs under that umbrella heading.

Informative Signs, 1931. A variety of these signs have very long names which have been substantially shortened for the chart. More modern sign systems have



short names similar to those employed in the chart for 1931.

Informative Signs, 1939: “Approach to a School Entrance” has two forms for that sign. “First Aid” signs give Christian and Islamic versions.

Informative Signs, 1950: “Fork Sign,” LC/C, presumably has a RC/C version though that is not given.

Informative Signs, 1952: Explanatory Notes seemingly are not required for GERSS.

Informative Signs, 1961: “Route Markers” is a broad grouping though the core idea of marking routes by numbers and key words is to be found in all varieties.

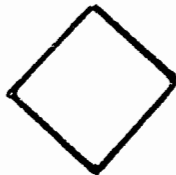
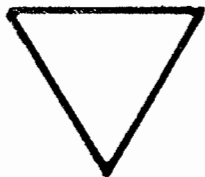
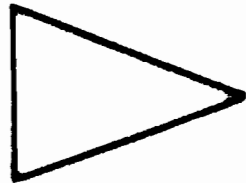
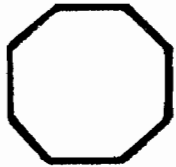
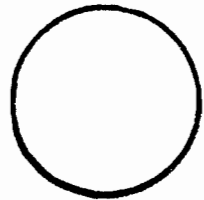
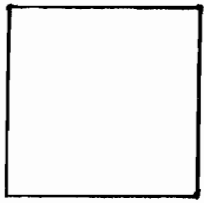
iv Sign Shapes and Color Formats

This last section of Appendix II provides illustrations of the major forms of sign shapes. It also includes pictorial representations of symbols for informative, regulatory and warning signs.

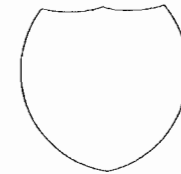
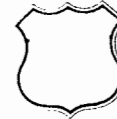
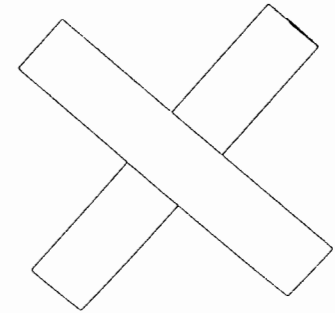
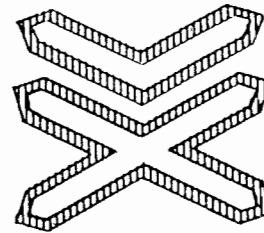
The remainder of this segment presents a synopsis of the colors employed and the meanings ascribed to them in major systems of signs present and past.

Since the Appendix serves as an adjunct to the main body of the monograph the specific sources of the primary materials apply here. To a considerable degree the contents of the Appendix functions as a distillate of the previous materials.

Basic Shapes for Signs



Other Shapes for Signs



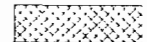
Color Code:
Sign Samples



R



BL



Y



G

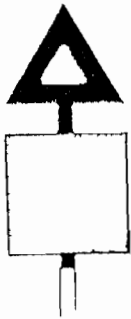


W/LY

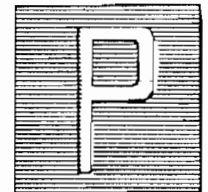
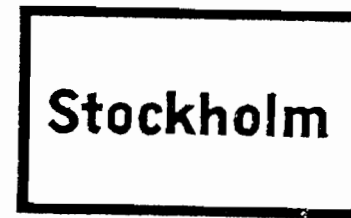
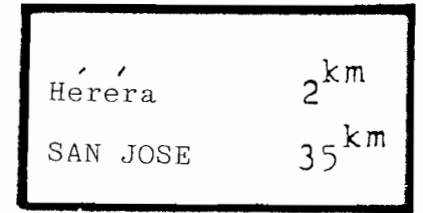
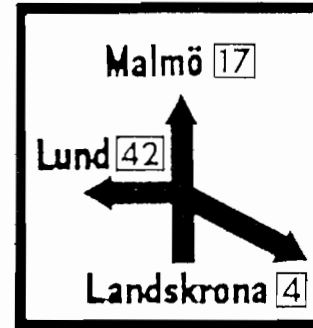


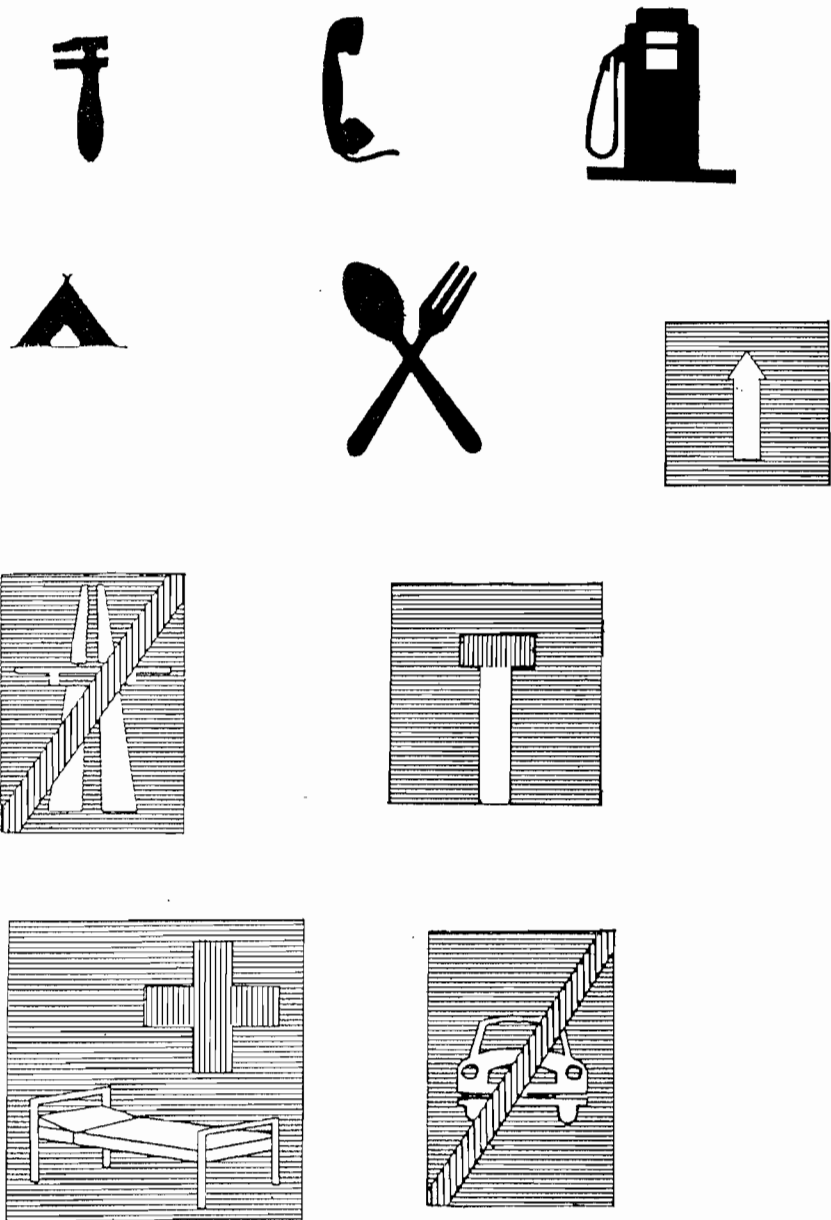
BLK

Double-Sign Shapes

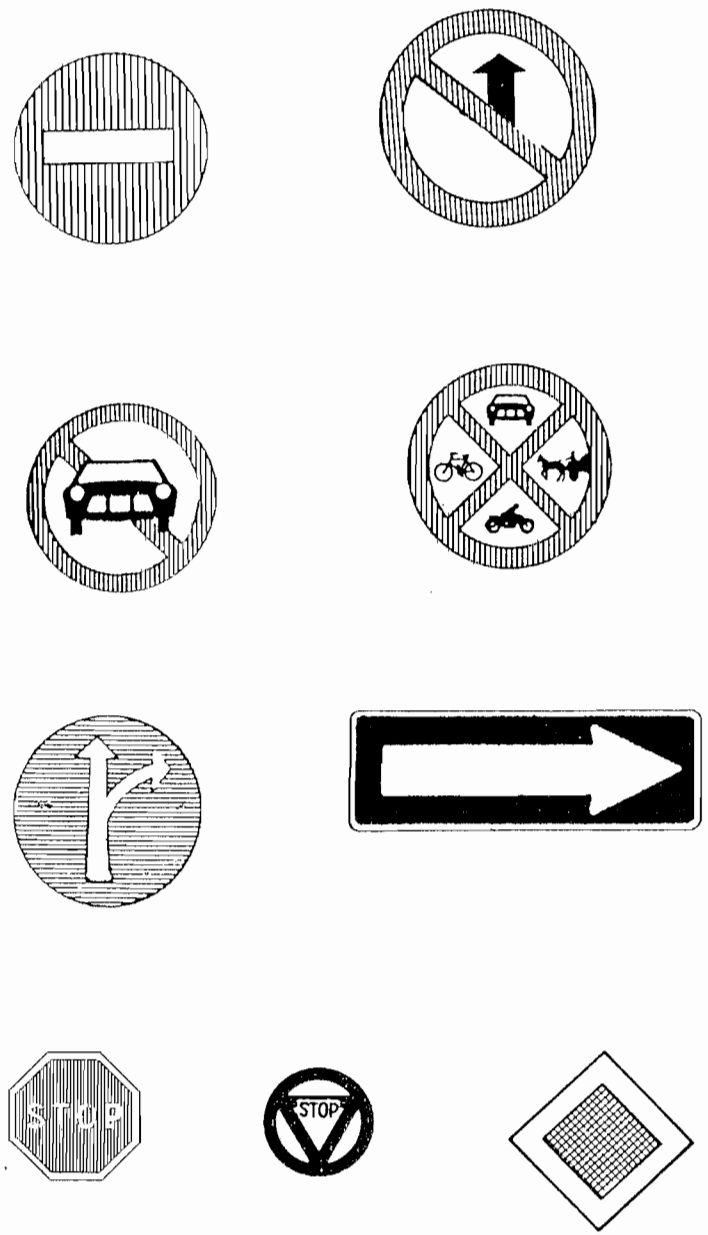


Informative Sign Symbol Sampling





Regulatory Sign Symbol Sampling



Warning Sign Symbol Sampling



Guide to Sign Illustrations

Page 200, Basic Sign Shapes: Left column (top to bottom): Square/Circle [or Disc]/Triangle-one point up [European system]/Octagon/Triangle-point down/. Right column: Rectangle-vertical emphasis/Rectangle-horizontal emphasis/Pentagon/Pennant/Trapezoid/Diamond

Page 201, Other Shapes: St Andrew's Cross with 1/2 arm second track/Railroad Crossbuck [American system]; Shields [US practice]

Page 202, Double Sign Formats: OBS and CASATC

Page 203, Informative Signs: Upper Left: Advance Direction/Upper Right: Confirmatory/Center Left: Place Identification/Center Right: Pedestrian Crossing/Lower Left: Direction/Lower Right: Parking

Page 204, Informative (cont'd): Sampling of symbols for "Signs Giving Notice of Facilities Which May Be Useful To Road Users"/Sampling of signs for "Signs Providing Useful Information for Drivers of Vehicles"

Page 205, Regulatory Signs: Upper Half: Prohibitory. Lower Half: Mandatory (upper), Priority (lower)

Page 205, Warning Signs: Sampling of Symbols

Sources: UN 1968, Draft Convention (1967); 1969 where noted. US TCD Handbook 1983; US MUTCD 1971; OBS, CASATC

b) Sign Shapes

The shapes of signs for major systems of signs include a variety of forms. Those for the US (many of these shapes and meanings are also shared by many other nations and systems) include:

Round shape for advance warning signs at railway crossings.

Diamond shape for warning signs.

Triangle (vertex down) for the "Yield" sign (this sign is originally a European system sign).

Rectangle (longer dimension horizontal) for many guide signs.

Rectangle (longer dimension vertical) for nearly all all regulatory signs.

Octagon for the "Stop" sign.

Penant (triangle with longer dimension horizontal) for the "No Passing" sign.

Trapezoid for recreational area guide signs (one of two permitted shapes).

Pentagon for school and advance school crossings.

Shield for route markers.

Crossbuck for railway crossings.

Australia's system of signs is similar to that of the US though some differences are present. These include: the circle which is also used for pedestrian signs; the equilateral triangle (one point up) for specific warning signs; the rectangle (longer dimension horizontal) for roadwork (construction) signs, special purpose signs and for supplementary plates (warning signs).

Canada and the US also share a variety of shapes and

meanings, but, again, differences are to be noted. These include a square-shaped sign for a variety of regulatory signs and for some tab signs. Rectangles are employed for other tab signs.

GERSS permitted triangles (one point up) diamonds, triangles over rectangles, or triangles over diamonds for warning signs. Regulatory signs, except for the "Stop" sign, could be either circular or rectangular in shape. Informative signs were to be rectangular in shape with the added requirement for direction signs that they be mounted on rectangles with the longer dimension horizontal. These last named signs could end in a point. ECAFE closely followed GERSS except for permitting either a round or octagon shape for the "Stop" sign. ECAFE allowed only the round shape for regulatory signs.

IAMM generally follows signage practices found in the US and in GERSS. IAMM, however, employs only round-shaped signs for regulatory signs save for the "Stop" and "Yield" signs.

The "Old British System" used a double approach of discs mounted above rectangles for many prohibitory and mandatory signs. In some instances the disc was exhibited without the rectangle for specific signs. Nearly all warning and informative signs displayed a triangle over a rectangle (longer dimension vertical). CASATC practice was similar to that of OBS in a variety of respects. Triangles placed over squares or rectangles indicated danger signs. Discs over triangles marked prohibitory and mandatory signs. Triangles for danger signs were frequently displayed with one point up; those for prohibitory functions were displayed in a reverse arrangement. Informative signs were similar to warning signs except for the lack of discs.

The UN system permitted either triangles (one point upwards) or the diamond-shaped sign for danger warning signs. The "Giveway" sign was a triangle with one point downwards. The pentagon was employed as an alternate for pedestrian crossing signs. The diamond-shaped sign was used for priority and end of priority signs. The square shape was utilized for the priority over oncoming traffic signs. Regulatory signs were displayed on circular-shaped backgrounds.

The circle is also employed for most regulatory signs in Japan, except pedestrian, "Stop," and "Priority" signs. Guide signs generally employed rectangles (longer dimension horizontal). Square-shaped signs are used for pedestrian signs within the regulatory sign category and for most signs in the "Indication" sign category (a form of regulatory sign that is separate in Japan; this type of sign frequency permits a given action). Warning signs are diamond in shape. Route markers employ distinctively shaped shields.

c) Systems Use of Color

Sign colors, beginning again with the US, follow these formats: Red serves as a ground or background color for the "Stop" sign, multi-way supplement plates, route markers for interstate highways and for "Do Not Enter" and "Wrong Way" signs. It is employed as a legend or symbol color for "One Way" signs, specific weigh station signs, and speed limit lights for night usage. It is a message color for those signs with a white, yellow, or orange ground.

White serves as the ground color for guide and regulatory signs (save the "Stop" sign), and for route



markers. It is the message color for those signs with a ground color of brown, green, blue, black, or red. Orange has the single usage of ground color for construction signs. Yellow is the ground color for warning signs, and for school signs. Construction warning signs are an exception to this stricture. Brown is the ground color for recreational and cultural guide and information signs. Green is the ground color for guide signs (excepting those with a brown or white ground) and for mileposts. It is the message color for "permissive parking regulations" signs with a white ground. Blue is employed as a ground color for informative signs that refer to "motorist services."

Australia's color code is similar to that of the US, though there are noticeable differences. Red finds use in speed regulations, "special hazard" and railroad crossing gate signs. It is also the message color for specific regulatory signs. Black serves as a message color for many signs of varying ground colors: white, yellow, yellow-orange, red-orange. It is the ground color for informative signs of large size, hazard markers, "width markers," "T-junction sight boards" and such specific signs as the "One Way" and "Stop on Red Signal."

White serves as ground color for most regulatory and informative signs. It is also so employed for "National Route Markers," fingerboards and street name signs. It is the message color for signs with green, blue, black, red or brown ground. Yellow serves as a construction sign ground color in Australia, and also for advisory speed signs and special purpose signs (in addition to warning signs). Some construction signs use fluorescent yellow-orange as a ground color.

Green is the color of messages for permissive parking

signs. "Standard Green" is the ground color for direction signs, kilometer plates and those fingerboards that have messages in reflective materials. "Freeway" green is the ground color for freeway and freeway quality expressways. Blue is the ground color for "State Route Markers" and service signs. Brown serves as ground color for "Tourist Route Markers" and informative signs."

Canada's color code bears considerable resemblance to previous remarks (save more specialized comments), but again, there are some differences. Red is, of course, the ground color for the "Stop" sign. It is the message color for all other "Right of Way" control signs of the regulatory type; it is also the border color for those same signs. White is the ground color for the previously described signs. White is the ground color for the previously described signs. It serves as the message and border color for the "Stop" sign. White is one of two colors for grounds of "Road Use Control" signs. It is also the ground color for miscellaneous regulatory signs. It serves as the message color (and border color) for the "School Ahead" sign, and for informative signs (or it is one of the official colors). And it can also be used for route marker ground color.

Black serves message and border color needs for regulatory signs of the miscellaneous type. It is also permitted for those same functions in "Road Use Control" regulatory signs. Warning signs exhibit message and border in black, except for the "School Ahead" sign. Yellow is the ground color for all warning signs, except the "School Ahead" sign and temporary conditions signs. Orange serves as ground color for temporary conditions signs. Blue acts as ground color for the "School Ahead" sign. It is permitted for usage as a ground color for guide type information signs, and for route markers. Blue is one of several per-

mitted colors for messages and borders for route markers (in those instances where route markers do not have a ground of blue).

Green serves as a ground color for guide signs and for guide signs and for miscellaneous informative signs. It is among the permitted colors for messages and borders for route markers. It is also permitted to be used as a ground color for route markers (though not when the message and border is green). Annular rings are green in color. Finally, brown is the ground color for "Off-road Facilities" signs of an informational nature.

The GERSS color code exhibited this format: yellow for warning signs and for the "Stop" sign. Black ("or a similar dark colour") served for symbols and borders for the "Stop" sign (when present) and for warning signs. More vague is the format of colors for regulatory signs: GERSS called for a ground that is light in color and a border that is darker. Red is recommended for borders and the accompanying oblique bar. Informative signs are to have either a light ground and dark letters or light letters and a dark ground. White ground and black letters were recommended.

CASATC followed a generally simple color code: black was employed for nearly all symbols and red served as the border color of upper signs for both danger and for prohibitory and mandatory signs. Yellow was utilized as a ground color for most lower signs. Oblique bars, where present, were red in color, as was the ground color for the "One Way" sign. Advance direction, and direction signs, and place and route identification signs had black grounds and white letters.

The "Old British System" made heavy usage of red as a border color for the upper signs. Red was also employed as a ground color for speed limit, no entry and stop signs for children crossings. Red was also utilized for no turn signs and signs for vehicle prohibitions for play streets. White served as a ground color of lower signs and black had a similar function for borders and symbols.

IAMM's color code included these components: white ground for regulatory signs and for guide signs. White was used for rim and letters of the "Stop" sign and the ground of the "Yield" sign. Red is used for oblique circle, the ground of the "Stop" sign and the border of the "Yield" sign. The first aid symbol is also red. Yellow serves as the ground color for warning signs. Black is the border and symbol color of the same signs; this applies to guide signs as well. Green ground, with white symbols, are used with high density roads. Blue is the ground color for "Auxiliary Services" signs; white is the message color for those signs.

ECAFE is akin to GERSS, though some differences of a muted sort are to be found. Warning signs can have either a white or yellow ground with black "or dark colour" symbols and red borders. Regulatory signs can have one of three ground colors: white, light yellow or yellow. Borders for those signs are to be red. The "Stop" sign is yellow in ground with symbols and bars in black. Informative signs have a white ground and black symbols.

Japan employs yellow ground for warning signs. Black is used for warning sign symbols. Green finds use as a ground color for guide signs on motorways; blue fulfills that function for other roadways. Blue also serves as symbol color for prohibitory signs. Prohibitory signs

exhibits red on rims and bars. It is also used for the ground color of the "Stop" sign and the rim of the "Slowdown" sign. White has multiple uses: the ground color on prohibitory signs, and the "Slowdown" sign and the symbol for the "Stop" sign. It is also the symbol color of indication and mandatory signs; the ground color for both is blue.

The UN system employs white in a broad range of usages. White is one of two acceptable colors for the Protocol type warning sign and "Stop" sign. It is also the ground color (one of two) for prohibitory or restrictive signs. It is an alternative ground color for mandatory and informative signs. White is a symbols color for the "American-type" "Stop" sign and for mandatory signs. Yellow is ground color for the American style warning sign and it serves as a ground color option for many of the signs previously described as having a white ground. Red serves as the ground color for one "Stop" sign model and it is used for the oblique bar and rim. It can also provide a rim color for mandatory signs and parking signs. Black is the rim and symbol color for the American style warning sign. Black, or dark blue, is found as a symbol color for many regulatory signs. Blue is often the ground color for mandatory signs and for parking signs."

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i Abbreviations for Sources

ACORD MUTCD 1975	Australian Committee on Road Devices
CASATC 1950	Central and Southern African Transport Conference 1950
ECMT 1972	European Conference of Ministers of Transport
G & L <i>IAMM</i>	Grotterod and Liavaag Pan American Highway Congresses, <i>Interamerican Manual</i>
ICMV 1909	Convention with Respect to the International Circulation of Vehicles
ICRMT 1926	International Convention Relative to Motor Traffic
LN CERCL/ LN DCT CERCL	League of Nations, Committee of Experts on the Codification of Road Law, 1938-1939
LN ECRT 1931	League of Nations, European Conference on Road Traffic
PAHC	Pan American Highway Congresses
PICHSS "Project"	Kikura and Matsushita PAHC
<i>RDMCS</i>	PAHC
UK HADTS	United Kingdom, History and Development of Traffic Signs
UK MOT	United Kingdom, Ministry of Transport
UN 1969 CORSS	UN Convention on Road Signs and Signals, E/Conf. 56/17

UN 1965 DCRSS UN Draft Convention on Road Signs and Signals, E/3999

UN 1967 DCRSS UN Draft Convention on Road Signs and Signals, E/Conf. 56/3

UN 1967 DCRSS-NSG UN Draft Convention on Road Signs and Signals, Note by Secretary-General

UN 1968 PSOC-RSS/
PSOC-DCRSS UN Proposals, Suggestions, and Observations

UN 1968 SC SR 23rd UN Second Committee, Summary Records of Decisions Taken at the 23rd Meeting

UN 1969 SR 1-8 UN Summary Records ... 1-8 Plenary Meetings

UN ECAFE 1964 UN Economic Commission for Asia and the Far East, *Code ... European Agreement on Road Markings*

UN ECE 1957 *Protocol on Markings*

UN ECE 1973 PORM UN ECE Draft Consolidated Resolution on Road Signs and and Signals

UN ECE 1977 DCRRSS

UN ECE 1971 EASCRSS UN ECE European Agreement Supplementing the Convention on Road Signs and Signals *Amendment 1. Convention ...*

UN ECE 1995 Amd 1.
UN 1952 GERSS UN Group of Experts on Road Signs and Signals, Draft Convention

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1961, 1971, 1978,
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GENERAL INDEX

Classification, 11, 15, 16, 19,
33, 82, 88, 92, 130
Fourth-digit Problem, 60,
61, 62, 63
Main Classification, 59,
66, 67, 68, 99, 108,
118, 120, 127, 145,
153, 155,
Explanatory Notes 59,
68-74,
General Note, 74, 75
Revisited, 59, 60, 61, 62,
63, 64, 65, 66
Types of Messages, 59,
60, 61, 62, 63, 64, 65
Variant Classification, 59,
66, 75-79, 108, 111,
155
General Note, 79

Glossary of Terms, 168-176

History
General, 15, 16, 17
General TCD, 80, 81, 82,
83, 87, 88, 89, 91, 92,
93
Traffic Signals, 15, 53, 54,
55, 80, 81, 82, 83, 93
Traffic Markings, 15, 56,
57, 58, 83, 153
Traffic Signs-General, 89

Traffic Signs-Warning,
80, 81, 82, 83, 86, 87,
91, 103, 104, 106, 107
Traffic Signs-Informative,
82, 83, 87, 114
Traffic Signs-Regulatory,
80, 81, 82, 83, 86, 87, 91,
126, 127, 128, 129, 130
136, 137
Traffic Signs-Earlier
History
Europe 1909-1931, 17,
18, 19, 20, 21, 22,
23
Old British System,
23, 24, 25
Europe 1938-39,
26, 27, 28, 29,
30, 31, 32, 33, 34
UN 1949, 35, 36, 37,
38, 39
Americas, 40, 41, 42,
43
Africa/Middle East/Asia
& Pacific, 43, 44,
45, 46
CASATC, 46, 47, 48,
49, 50, 51, 52

Messages and Message
Systems

Traffic Signals, 95, 96,
97, 98, 99, 100, 101,

102

- Traffic Markings, 155,
156, 157, 158, 159,
160, 161, 162, 163,
164, 165, 166, 167
- Traffic Signs
- Informative Signs,
 115, 116, 117, 118,
 119, 120, 121, 122,
 123, 124
- Regulatory Signs, 126,
 127, 128, 129, 130,
 131, 132, 133, 134,
 135, 136, 137, 138,
 139, 140, 141, 142,
 143, 144, 145, 146,
 147, 148, 149, 150,
 151, 152
- Warning Signs, 104,
 105, 106, 107, 108,
 109, 110, 111, 112,
 113
- Classification of Messages,
60, 61, 62, 63, 64, 65, 66
- TCD Systems:
- General, 15, 53, 55,
 African System, 16, 17,
 40, 83
- American System, 16, 40,
 44, 46, 82, 83, 86, 87,
 92, 106, 108, 112,
 131, 132, 133, 143,
 144, 146, 147, 154,
 178, 179, 207, 215
- Australia, 107, 152, 155,
 208, 211, 217
- CASATC, 16, 37, 44, 46,
 47, 48, 49, 50, 51, 53,
 55, 57, 103, 114,
 127, 152, 178, 179, 180,
 182, 183, 184, 186, 187,
 191, 196, 197, 198, 199,
 207, 208, 209, 211, 213,
 217
- Canadian UTCD, 16, 40, 73,
 74, 75, 81, 86, 89, 90,
 95, 112, 114, 127, 128,
 129, 130, 142, 148,
 149, 150, 157
- Central America, 1, 81, 87,
 92, 106, 112, 116,
 128, 131
- ECRT 1931, SEE: LN
- ICMV 1909, 15, 16, 17, 18,
 19, 20, 26, 35, 153,
 196, 217
- ECE, 138
- ECE 1957, 154, 156, 218
- ECE 1971, 100, 101, 111,
 147, 161, 163
- ECE 1972, 147, 161
- ECE 1973, 163, 164, 165,
 166, 167, 218
- ECE 1977, 100, 101, 122,
 123, 147, 218
- ECE 1995, 113, 154
- ECAFE, 73, 85, 86, 93,
 94, 95, 96, 97, 103, 104,
 105, 113, 114, 115, 126,
 127, 128, 129, 137, 138,
 152, 157, 180, 209, 214,
 218
- European System, 16, 17,
 43, 44, 80, 81, 82, 83,
 90, 91, 92, 108, 132,
 136, 143, 146, 154,
 155, 175, 179
- GERSS, 16, 17, 35, 36, 40,
 43, 44, 45, 48, 73, 80,
 81, 82, 83, 84, 85, 86,
 87, 88, 91, 93, 94, 95,
 96, 97, 103, 104, 105,
 106, 107, 112, 113,
 114, 115, 116, 120,
 126, 127, 128, 129,
 130, 131, 138, 140,
 141, 142, 149, 154,
 155, 157, 179, 180,
 182, 184, 187, 192,
 197, 198, 199, 209,
 213, 214, 218
- IAMM, 40, 73, 81, 83, 84,
 85, 86, 92, 103, 104,
 105, 112, 113, 114,
 125, 126, 128, 131,
 140, 141, 148, 150,
 151, 154, 155, 156,
 179, 180, 209, 214,
 217
- ICRMT 1926, 16, 18, 19,
 20, 21, 26, 34, 35,
 153, 196, 217
- International System, 82,
 146
- Japan, 45, 46, 214
- LN 1931, 16, 20, 21, 22,
 23, 26, 28, 29, 30, 31, 34,
 35, 49, 114, 126, 136, 137,
 153, 182, 189, 197, 198,
 217
- LN 1939, 16, 26, 27, 28,
 29, 30, 31, 32, 33, 34,
 35, 114, 126, 127, 179,
 180, 181, 182, 186, 196,
 197, 199, 217,
- Nordic, 89, 107
- OBS, 17, 23, 24, 25, 44,
 45, 48, 57, 58, 83, 88,
 104, 106, 179, 180, 207
- Pan-American, 43
- PIARC, 56
- Scandinavia, 81, 92, 106,
 128
- SEE ALSO: Nordic
- US MUTCD, 16, 36, 40,
 41, 42, 43, 54, 56, 69,
 70, 73, 74, 75, 79, 85,
 86, 87, 90, 91, 94, 95,
 97, 101, 102, 104, 105,
 106, 108, 111, 112, 113,
 114, 115, 124, 125, 126,
 129, 130, 148, 149, 151,
 152, 156, 157, 167, 171,
 172, 173, 179, 180, 184,
 187, 192, 198, 199, 207,
 208, 209, 210, 211, 218
- UN 1968, 15, 16, 17, 51,
 68, 69, 70, 71, 72, 74,
 75, 79, 80, 81, 82, 86,
 87, 88, 89, 92, 93, 94,

96, 97, 98, 99, 100, 101,
102, 103, 104, 105, 106,
107, 108, 109, 110, 111,
112, 113, 114, 115, 116,
117, 118, 119, 120, 121,
122, 124, 126, 128, 129,
131, 132, 132, 133, 134,
135, 136, 137, 138, 139,
140, 141, 142, 143, 144,
145, 146, 147, 148, 149,
151, 152, 153, 154, 155,
158, 159, 160, 161, 162,
163, 165, 166, 170, 171,
173, 177, 179, 180, 182,
185, 187, 188, 194, 197,
198, 207, 215, 217, 218
UN 1949, 16, 24, 26, 27,
28, 30, 33, 35, 36, 37,
38, 39, 46, 48, 49, 50,
51, 55, 57, 80, 81, 82,
83, 85, 86, 87, 88, 89,
90, 91, 92, 93, 94, 95,
97, 103, 104, 106, 107,
113, 127, 128, 129, 130,
131, 137, 141, 142, 152,
153, 154, 155, 156, 159,
170, 171, 179, 180, 182,
183, 186, 190, 196, 198,
215

INDEX OF NAMES

Australia/Australian, 44, 107,
152, 155, 208, 211, 217
AASHO, 41, 42
Alberta, 90
Argentina, 43, 84, 125, 150,
180
Africa/African, 16, 17, 40,
43, 44, 46, 47, 48, 50,
83, 152, 178, 180
American Engineering
Congress, 42, 54, 56
Asia/Asian, 40, 43, 44, 45,
92, 112, 112, 152
American Travel Congress,
40, 43
Americas/American, 16, 40,
43, 44, 46, 82, 83, 84, 85,
86, 87, 92, 93, 103, 106,
107, 108, 111, 112, 113,
129, 131, 132, 143, 144,
146, 147, 152, 178, 179,
207, 215
Angola, 47
Austria, 21

Baltic States, 21
Bangladesh, 44
Bechuanaland Protectorate,
47
Belgium, 21, 47
Belgium Congo, 47
Bogota, 84
Botswana, 47

Brazil, 84
Britain/British, 17, 21, 23,
24, 37, 44, 45, 57,
83, 88, 93, 106, 142,
175
British Columbia, 90
British MOT, 23
British RRB, 141, 142
Burundi, 47

Cameroons, 47
CASATC, 37, 46, 47, 48, 49,
50, 51, 52, 53, 55, 57, 93,
103, 114, 127, 152, 178,
179, 180, 181, 182, 183,
185, 191, 196, 198, 199,
207, 213, 217
Central Africa, 47
Central African Republic, 47
Central & Southern Africa
Conference,
SEE: CASATC
Canada/Canadian, 14, 16, 40,
73, 74, 75, 81, 86, 89, 90,
95, 112, 127, 128, 129,
130, 142, 148, 149, 150,
151, 157, 171, 172, 173,
178, 209, 212
Cape of Good Hope, 43
CCURS, 21, 28, 31, 49
CEMT, 89
Central America, 81, 87, 92,
106, 112, 116, 128, 131
Chad, 47
Colombia, 83

Commonwealth, 88
CRICMV, 17, 18, 153
CRRT, 33
CTG, 26
Cuba, 19
CERCL, 26, 27, 28, 29, 30,
31, 32, 33, 34
Congo, 47

Danzig, 21
Denmark, 17, 21, 140
Detroit, 41

East Africa, 47
East African High
Commission, 47
ECAFE, 73, 85, 86, 93, 95,
96, 97, 103, 104, 105,
113, 114, 115, 126, 127,
129, 137, 138, 149, 152,
154, 157, 180, 214, 218
ECE, 86, 89, 113, 122, 123,
126, 138, 147, 154, 155,
156, 162, 163, 164, 165,
166, 167, 218
ECMT, 89, 147, 162, 217
ECOSOC, 83
Ecuador, 150
Egypt, 19, 44, 106
Eliot, 86, 114
English/England, 17, 20, 21,
46, 58, 114, 142, 151,
168, 173
ESCAP, 85, 137
Equatorial Guinea, 47

Europe/European, 15, 16, 17,
19, 20, 21, 26, 29, 35, 39,
43, 44, 45, 46, 55, 57, 71,
80, 81, 82, 83, 86, 88, 89,
90, 91, 92, 93, 100, 101,
103, 106, 107, 108, 111,
113, 116, 122, 123, 130,
130, 132, 136, 143, 146,
147, 148, 153, 154, 155,
156, 162, 163, 164, 165,
166, 172, 175, 179
Evans, 54

Finbogason, 89, 90, 130, 158
Finland, 17, 19
Fowler, 102, 148
France/French, 19, 20, 21, 47
172, 173
French Equatorial Africa, 47

Gabon, 47
Geneva, 26, 156, 162
German/Germany, 15, 19, 21,
45, 46, 54, 93
Great Britain, 17
GERSS, 1, 16, 27, 36, 40, 43,
44, 45, 48, 73, 80, 81, 82,
83, 84, 85, 86, 87, 88, 91,
93, 94, 95, 96, 97, 103,
104, 105, 106, 107, 108,
112, 113, 114, 115, 116,
120, 126, 127, 128, 129,
130, 131, 138, 140, 141,
142, 154, 155, 157, 171,
179, 181, 182, 184, 187,

192, 197, 198, 199, 209,
213, 214, 218
Grotterod & Liavag, 89, 106,
116, 127, 217
Group Restraint, 89
Guinea Coast, 47
Guatemala, 84

Hawkins, 54, 56, 102, 112,
115, 149, 157, 167
High Commission for
Basutoland, 47
Ho Chi Minh City, 85
Honduras, 83
HRB, 141

Iceland, 17, 88
ICMV, 217
ICRMT, 19, 20, 217
IMSA, 95, 173
India, 44
Indonesia, 113
International Bank for
Reconstruction &
Development, 47
IPRA, 131, 139
SEE ALSO: PRI
Iran/Iranian, 44, 122
Ireland, 21, 81, 87, 106,
115, 116, 128, 130
IRF, 139, 141
Islamic, 132
Italy, 21
ITE, 90

Kell, 28
Kenya, 47
Kikiura & Matsushita, 152,
217
Krampen, 15, 16, 21, 48, 83

Japan/Japanese, 45, 46, 93,
94, 97, 99, 100, 140, 152,
210, 214
Johannesburg, 44, 46
Joint Committee, 90

Latin America, 92, 112
Lay, 15, 56
League of Nations, 20, 21,
22, 23, 26, 27, 28, 29, 30,
31, 32, 33, 34, 49, 126,
127, 114, 129, 136, 137,
153, 179, 180, 181, 182,
186, 189, 196, 197, 198,
199, 217
Lesotho, 47
London, 54, 55

McLendon, 14, 174
Macnee, 158
Malawi, 44, 47
Malaya, 44
Manitoba, 90
Mexico/Mexican, 84, 113,
125, 150, 151
Mexico City, 84
Middle East, 40, 43, 44
Minnesota, 41
Montevideo, 84

MVASHD, 41
NCSHS/ National Conference
on Streets & Highway
Safety, 42
Netherlands, 21
New Zealand, 44
1909 Conference, 17
1931 Committee, 44
1933 Committee, 23, 24, 57,
58
1944 Committee, 44
Nordic, 89, 127
Nordic Council, 89
Nordic Road Committee,
89
North America/North
American, 35, 43, 45,
74, 82, 100, 157
Norway/Norwegians, 17, 89,
116, 127, 140
North Africa, 44
Northern Rhodesia, 47
Nova Scotia, 90
NRC, 141
Nyasaland Protectorate, 47
OBS, 17, 23, 24, 25, 44, 45,
47, 48, 57, 83, 88, 106,
179, 180, 207, 209, 214
Oklahoma, 130
Ontario, 90
OTA, 139
Ottawa, 90

Pacific, 40, 43, 44, 92, 152
Pakistan, 44
Pan American Highway
Congresses, 40, 43,
83, 140, 180
Pan-American Road
Congress, 43
Pan American Union, 43
PAHC, 42, 83, 84, 85, 140,
141
Paris, 19, 26, 44, 55
Peru, 84
PIARC, 56
Portugal, 47
Quebec, 90
Ruandi Urundi, 47
Rumania, 108
Russia, 17
Rwandi, 47
Saigon, 85
San Carlos de Bariloche, 43
Saskatchewan, 90
Scandinavia, 17, 19, 21, 81,
88, 89, 92, 106, 116, 128
Sessions, 41, 42, 43, 55, 56,
114
Shoaf, 36, 102, 148, 167
Siam, 19
South Africa, 152
Southern Africa, 44, 46
Southern Rhodesia, 47
Spanish, 114, 150, 151

Spanish Guinea, 47
Sri Lanka, 44
Suez Canal, 43
Sub-Saharan Africa,
44, 92
Swaziland, 47
Sweden, 17, 140
Swiss/Switzerland, 19, 21
Tanganyika, 47
Tanzania, 47
TCC, 82
TCTS, 84, 140, 141
Teguciugapa, 83
Thailand, 19, 44
Tripp, 54, 55
Turkey, 44, 86, 88, 106
Uganda, 47
Union of Official Travel
Organizations (OTA),
139
United Kingdom, 15, 24, 25,
30, 45, 47, 48, 54, 57, 81,
87, 88, 100, 104, 128,
155, 217
UK MOT, 48, 88, 217
UN, 14, 15, 16, 17, 26, 28,
30, 35, 36, 37, 38, 39, 43,
44, 46, 48, 49, 50, 51, 54,
55, 57, 68, 69, 70, 71, 72,
73, 74, 75, 79, 80, 81, 82,
83, 85, 86, 87, 88, 89, 90,
92, 93, 94, 95, 96, 97, 98,
99, 100, 101, 102, 103,

104, 106, 107, 108, 109,
110, 111, 112, 113, 114,
115, 116, 117, 118, 119,
120, 121, 122, 123, 124,
126, 127, 128, 129, 130,
131, 132, 133, 134, 135,
136, 137, 138, 139, 140,
141, 142, 143, 144, 145,
146, 147, 148, 149, 150,
151, 152, 153, 154, 155,
156, 158, 159, 160, 161,
162, 163, 164, 165, 166,
168, 170, 171, 173, 175,
176, 177, 179, 180, 182,
183, 185, 187, 190, 194,
196, 197, 198, 207, 210,
215, 217, 218
UNCRT, 26
UN ECOSOC, 83
UN GERSS: SEE GERSS
Union of South Africa, 47
University of Chicago, 13
Uruguay, 19, 84, 150, 151
US, 14, 16, 18, 28, 36, 40, 41,
42, 43, 47, 51, 54, 56, 58,
68, 69, 70, 71, 73, 74, 75,
79, 84, 86, 87, 90, 91, 93,
94, 96, 97, 98, 99, 100,
101, 102, 104, 105, 106,
111, 112, 114, 115, 124,
125, 126, 128, 129, 130,
137, 141, 142, 143, 148,
149, 150, 151, 152, 156,
157, 159, 167, 171, 172,
173, 174, 175, 179, 180,

181, 182, 184, 197, 198,
199, 207, 208, 209, 210,
211, 218

US Coast Guard, 66

Usborne, 16, 86, 88, 106,
128, 129

USSR, 21, 132, 138

Van der Nest, 152

Van Vechten, 142

Venezuela, 125, 150

Vietnam, 85

Victorian, 57

Washington, D.C., 84

Webster, 54, 57

West-central Africa, 47

West Africa, 47

Western Hemisphere, 16, 42,
79, 81, 82, 83, 85, 94, 95,
97, 101, 140, 148, 154,
178, 179

Winipeg, 90

Worboys, 88

World War I, 19, 57

World War II, 26, 27, 44

Yugoslavia, 21

Zaire, 47

Zambia, 47

Zanzibar, 47

Zuniga, 86, 87, 88, 105, 106,
116, 131, 138, 141, 142

INDEX OF TRANSPORTATION-MARKING PHENOMENA

About-turn (U-turn) Sign,
192

Additional Panels, 111

Additional Signs at
Approach to Level
Crossing, 77

Advance Direction &
Direction Signs, 36, 38,
50, 186, 187, 213

Advance Direction Signs,
33, 38, 51, 115, 118,
186, 203, 207

Advance School Crossing
Signs, 208

Advance Turn Arrow, 187

Advance Warning Signs,
111, 208

Advisory Exit Sign, 185

Advisory Speed Plate, 185

Advisory Speed Sign, 211

Aero Lights, 61, 65

Aero Nav Aids, 169

Aids, 53, 54, 56, 60, 61,
62, 80, 96, 154, 155, 156,
157

Aircraft Crossing Signs, 76

Airfield Sign, 185

Airport Direction Signs, 117

Airport Signs, 119

All Lighted Signals, 75

All Motor Vehicles Are
Prohibited Signs, 197

Alphanumeric Markings,
68, 73, 98

Alternative Parking Signs,
188, 193

Alternative Route
Marker, 187

Alternate Sign, 181, 196

Animal Crossing Sign, 109,
139

Animal Drawn Vehicles
Sign, 139

Approach to a Major
Road Sign, 183

Approach to a School
Entrance, 183, 186,
196, 199

Arrows, 78, 102, 162, 165

Auto Repair Service Sign,
122

Audible Pedestrian Signals,
68

Audible Warning Devices-
Prohibition, 140

Authorized Parking Place
Sign, 186

Auxiliary Markers, 187

Auxiliary Route Markers,
187

Auxiliary Service Signs,
38, 125, 214

Barricades, 68, 74, 94, 155,
167

Barricades-Portable, 79

Barricades-Permanent, 79

Beacons, 101

Beaconage, 174
 Bend Signs, 20, 29, 76, 181, 196
 Beware of Animals Signs, 183, 184
 Bicycle Prohibitions Sign, 31
 Bike Route Sign, 32
 Bollard, 52, 55, 175
 Border Lines, 165
 Built-up Areas Signs (?),
 Bump Sign, 185
 Buoyage, 174
 Bus Lane Signs, 151
 Bus Stop Sign, 106
 Business Route Marker, 187
 Buttons, 58, 161
 By-Pass Markers, 187

Campground Signs, 119
 Camping Sites, 122, 125
 Campsite Signs,
 Can Buoy, 169
 Cardinal Direction Marker, 187
 Car-Sleeper Sign, 123
 Carriageway Bollards, 163
 Carriageway (Highway)
 Narrow Signs, 76, 109, 183
 Carriageway Limit Lines, 78
 Carriageway Markings, 57, 71, 158, 162, 173
 Cats-eye, 58
 Cattle Signs, 112

Cattle or Animal Crossing Signs, 76, 185
 Caution/Indication Signs, 34
 Caution or Indication Signs, 29, 32, 186
 Caution Signs, 23, 32, 33, 34, 114, 186
 Center Line Markings/Center-line Markings, 56, 57, 58, 157, 167
 Centerl-lines, 39, 57
 Channelizing, 167
 Channelizing Devices, 68, 74, 155
 Channelizing Devices-Traffic Cones, 79
 Channelizing Devices-Tubular Makers, 79
 Chevron Markings, 166
 Children Crossing Signs, 109
 Children Signs, 29, 76, 183, 184, 185, 214
 Closed to All Vehicles Signs, 189
 Closed to All Vehicles in Both Directions, 77, 136, 139
 Combination Junction Signs, 187
 Commercial Vehicles Signs, 192, 198
 Compulsory Cycle Track, 78, 191, 193
 Compulsory Foot-Path/- Foot Path, 78, 193

Compulsory Minimum Speed, 78, 147, 191, 193
 Compulsory Roundabout, 78, 134, 193
 Compulsory Snow Chains Signs, 147
 Compulsory Track for Riders on Horseback Signs, 78, 193
 Confirmation Signs, 124
 Confirmatory Signs, 117, 119, 123, 188, 203, 207
 Confirmatory Direction Sign, 122
 Confirming and Reassurance Route Marker, 187
 Construction & Maintenance Signs, 67, 71, 72, 112
 Construction Signs, 106, 211
 Construction Warning Signs, 211
 Continuous Lines for Particular Purposes, 78
 Continuous Lines for Special Purposes, 160
 Corner Markings, 58
 Cross-drain or Dip Sign, 183
 Crossing Signs, (Cross Walk, Deer, Truck, Pedestrian, Cattle), 185, 196
 Cross-roads Notice Board,
 Cross Road Signs, 184
 Cross-roads Signs, 24, 29, 181, 183, 185, 197
 Crossroad Signs, 184

Crosswalk Boundaries, 56
 Crosswinds/Cross-winds Signs, 76, 111, 185
 Curb Markings, 156, 157
 Curve Markings, 58
 Curve Sign, 184, 186
 Custom House Sign, 23
 Cycle Signals, 100
 Cycle Track Sign, 50, 147
 Cyclist Crossings Signs, 162, 166
 Cyclist Crossings Markings, 78, 163, 166
 Cyclists Entering or Crossing Signs, 76, 185
 Cyclist Signals, 66, 70, 98
 Cyclists Signs, 109

Danger Signs, 20, 24, 28, 29, 34, 36, 43, 48, 103, 106, 126, 174, 180, 183, 209
 "Danger Signals" (=Signs), 19, 20
 Danger Signals Replaced Notice-Boards, 19
 Danger Warning Signs, 35, 36, 48, 50, 51, 74, 86, 103, 104, 106, 107, 108, 111, 126, 131, 143, 170, 174, 178, 180, 210
 Danger Warning Sign at Approach to Intersection, 197
 Danger-Warning Signs, 22
 Dangerous Bends, 133, 185,

186
Dangerous Curves Sign, 183, 184
Dangerous Descent Sign, 185
Dangerous Descent/Steep Ascent Signs, 108
Dangerous Fork Sign, 183, 196
Dangerous Hill Sign, 183, 184
Dangerous Reverse Bend Winding to R, L, 184
Dangerous Sharp Turn, Right, 184
Dangerous Shoulders Signs, 113
Dangerous Steep Descent to L, R Sign, 184
Dangerous T-Junction Sign, 183
Deflecting Arrows, 165
Delineators, 68, 73, 74, 156
Delineators-Curb, 79
Delineators-Upright, 79
De-Prohibition Sign, 32
Descriptive Signs, 51, 187
De-Restriction Notice Signs, 191
De-Restriction Signs, 198
De-Restrictions or the Removal Sign, 190
Designation Signs, 116
Destination Signs, 118, 124, 125, 187

Detour Signs, 123
Descent/Ascent Signs, 76
Detour Ahead Signs, 51
Detour Arrows, 187
Detour Signs, 51
Diagrammatic Signs, 33, 125
Dip Pavement Ends Sign, 185
Dip Signs, 109
Dike Signs, 125
Direction Arrows, 124
Direction Signs, 33, 38, 43, 51, 78, 115, 116, 117, 118, 119, 171, 186, 187, 203, 207, 209, 212, 213
Direction and Destination Signs, 45
Direction and Distance Signs, 45
Direction of Travel Signs, 32
Direction Prohibited Sign, 192
Direction to be Followed Signs, 23, 191, 192
Direction to be Taken Sign, 190
Directional Arrows, 119, 187
Directional Assemblies, 187
Directional Regulatory Information Signs, 41
Directional Signals, 125
Directional Signs, 43, 115, 187

Distance Between Vehicles Signs, 77
Distance Signs, 125, 187
Distance and Direction Signs, 67, 73
Distance and Destination Signs, 187
Divided Highway Signs, 185
Divided Highway Ends Sign, 185
Diversion Sign, 122, 123
Do Not Enter Sign, 148, 192, 210
Do Not Pass Sign, 192
Double Arrow, 185
Double Bend to L, R Sign, 151
Double-Sign, 24, 29, 37
Drawbridge Signals, 70
Driving of Vehicles Less Than ... Metres (... Yards) Apart Prohibited Sign, 194
Dual Sign Forms, 45, 83
"E" Road Identification Sign, 122
Edge Lines, 157, 167
Edge Markings, 157, 163
Edge Reflectors, 39, 57
Emergency Signals, 67, 70, 93
Emergency Signs,

Emergency Stopping Signs, 149
End ... Mile Speed Sign, 192
End of All Local Prohibitions Imposed on Motor Vehicles, 134, 146, 193
End of Compulsory Minimum Speed, 78, 147, 193
End of Motorways Sign, 121
End of Particular Prohibition Signs, 78
End of Priority Signs, 38, 133, 144, 186, 193, 209
End of Prohibition of Overtaking (Passing) Sign, 146, 193
End of Prohibition or Restriction Signs, 77, 146
End of Speed Limits Signs, 146, 191, 193
End-One Way Sign, 192
End to Prohibition and Restriction Signs, 72, 146
Entry Prohibited for Category of User or Vehicles, 77
Entry Prohibited for Several Categories, 77
Entry Prohibited for Vehicles Whose Weight or Dimensions Exceed Certain Limits Signs, 77

Exit Direction Sign, 187
Exit From a Limited
Duration Parking Zone,
122, 135
Exit Sign, 112
Expressway Signs, 124,
187

Facilities which maybe
useful for road users,
Falling Rocks Sign, 76, 109,
185
Ferry-Boat Landings
Signals, 70, 76, 99
Ferry Sign, 123
Ferry Landing Sign, 125
Filling Station Sign, 186
Fingerboards, 211
First-Aid Signs, 33, 122,
186, 188, 189
First-Aid Station Signs,
33, 186
Flash Lights, 55
Flashing Arrows, 102
Flashing Beacons, 66, 68, 70,
75, 98, 99, 101, 173
Flashing Lights, 95, 98, 99
Flashing Signals, 95, 99, 102
Flashing Warning Beacons,
76
Foot Path Signs, 147
Fork Sign, 186, 199
Freeway Signs, 124
Gate and Motor Gate L, R,

Sign, 183
Gate or Level Crossing
Barrier, 183
General Danger Sign,
196
General Information Signs,
125
General No Entry Sign,

General Signs, 186
General Speed Limit Signs,
123
Give Way Sign, 133, 143
194, 200
Goods Vehicles Prohibited
Signs,
Gore Signs, 187
Graphic Markings, 67, 73,
78
Guidance Signs, 45
Guide Lines, 165
Guide Lines for Turning
Vehicles, 78, 161
Guide Signs, 45, 46, 75,
114, 115, 124, 125, 141,
180, 208, 210, 211, 213,
214
Gutter Signs, 20, 181, 196

Halt Sign, 196
Hazard Markers, 155, 156,
211
Hazard Markings,
Hazardous Corners Signs,
24

Hill Signs, 184, 185
Hollow Signs, 20, 29, 30,
37, 181, 196
Horizontal Markings, 67, 73,
78, 155
Horn Blowing Prohibited
Sign, 192
Horseback Rider Path Signs,
147
Hospital Signs, 38, 51, 120,
186, 188
Hotel Sign, 125
Hump Signs, 109

Indication Signs, 32, 33, 34,
36, 38, 46, 50, 114, 152,
210, 215
Informacion Signs, 114
Information Signs, 50, 87,
187, 212
Informational Signs, 114
Informative Signs, 22, 32,
36, 38, 50, 51, 67, 72,
74, 75, 84, 103, 114,
115, 116, 117, 118,
122, 125, 143, 174,
180, 186, 187, 198,
199, 203, 204, 207,
209, 211, 212, 213,
215
Informative Signs Other
Than Parking Signs, 116,
117, 180
Informative Signs Other
Than Priority & Parking

Signs, 117
Informatory Signs, 76
In-Roadway Lights, 76
Intersection Control
Beacon, 75
Instruction Signs, 45, 46
Interaction of Vehicles
with Other Moving
Objects Signs, 71
Intersection w. a Minor
Road, 197
Intersecton w. a Minor
Road or Non-Priority
Road, 184
Intersection w. a Non-
Priority Road, 183
Intermittent Moving Hazards
Signs, 67, 76, 109
Intermittent Moving
Object Signs, 71
Intersection Signs, 67,
71, 108, 109
Islands & Other
Devices, 155

Keep Left Signs, 52
Keep-Off/Keep Off
Median Signs,
130, 194
Keep Right Sign, 149,
192
Kerb Markers, 155
Kilometer Plate, 212

Junction Markers, 187

Junction Markings, 58

Lane Control/Lane-Control Signals, 54, 102

Lane-direction Control Signals, 96

Lane Lines, 56

Lane Markings, 39, 57, 58

Lane-selection Arrow Markings, 166

Lane-Use Control Signals, 66, 70

Lane-Use Control Signs, 198

Lane-Use Control Signs at Intersections, 192

Lane-Use Signs, 130

Large Arrow, 184

Left Turn Signs, 149

Level-Crossing Additional Panels, 185

Level-Crossing Barrier, 196

Level-Crossing Guarded, 181, 196

Level Crossing Immediate Vicinity, 185

Level-Crossing in the Immediate Vicinity, 183, 196

Level-Crossing Notice-Board

Level Crossing Signs, 57, 196

Level-Crossing Signs, 33, 181

Level-Crossing Signs with Barrier, 20, 181

Level-Crossing Stop Sign, 52, 57, 183, 191

Level-Crossings Unguarded, 20, 181

Level-Crossing Warning Cross, 183

Level-Crossing with Gates Signs, 28, 110, 183, 185

Level-Crossing without Gates Signs, 28, 109

Level (Grade) Crossing Signs, 29, 108

Level/Grade Crossing Signs, 67, 110

Level (Railway) Crossing Signs, 66, 70, 72, 93, 95, 98, 101

Light Signals, 185

Light Traffic Signals

Lighted Devices, 169

Lighted Signals, 172

Lighted Signs, 94

Lighted Traffic Signals, 21, 61

Lighting Devices, 67, 70, 76

Lights, 66

Limited Duration and Parking Zone Sign, 188

Limited Duration Parking Zone Signs, 193

Lines, 164, 166

Loading Zone Signs, 186

Local Traffic Sign, 130, 194

Lodging Signs, 122

Longitudinal Lines/Longitudinal-Lines, 157, 161, 163, 164

Longitudinal Markings, 67, 73, 78, 155, 156, 159, 160, 163, 164, 165, 167,

Loose Gravel Sign, 76, 109, 185

Low Clearance Sign, 184, 185

Low-flying Aircraft Sign, 111

Low-flying Aircraft Signals, 70, 76, 99, 111

Maintenance Signs,

Major Road Ahead Signs, 51, 186

Major Road Signs, 196

Mandatory Signs, 25, 32, 38, 49, 67, 72, 75, 78, 127, 134, 138, 141, 142, 146, 147, 149, 152, 181, 190, 191, 193, 215

Marine Aids to Navigation, 62, 63, 169

Marine Lights, 61, 65, 73

Markers, 41, 124

Markings (General), 59, 60, 62, 63, 64, 66, 68, 71, 155, 169, 170

Markings (Traffic), 22, 42,

53, 73, 154, 156, 158, 159, 161, 162, 163, 165, 167, 176

Markings for Particular Situations, 165

Markings of Obstructions, 166

Maximum Speed Limits Signs, 22, 146, 148, 189, 194

Maximum Height of Vehicles, 190

Maximum Width of Vehicles Sign, 190

Mechanical Help Signs, 186

Merging Traffic Sign, 106

Mile/Kilometer Posts, 125

Mileposts/Mile Posts, 39, 67, 211

Minimum Speed Limit Sign, 192

Minimum Speed Sign, 130

Miscellaneous Control Signs, 127

Miscellaneous Informative Signs, 213

Miscellaneous Regulatory Signs, 212

Miscellaneous Signs, 72, 188

Miscellaneous Signals, 67, 70, 76

Miscellaneous Symbol Signs, 122

Miscellaneous Warning Signs,

Motor-Bus Sign, 33
 Motor Gate Sign, 183
 Motor Vehicles (Motor Vehicles, Motor Cycles) Prohibited Signs, 189
 Motor Vehicles Prohibited Sign, 197
 Motor Vehicle Signals
 Motor Vehicle Weight Over 5.5 Tons Sign, 189, 197
 Motorist Service Sign, 211
 Motorway Signs, 121
 Mountain Road Sign System, 115
 Movable Bridge Signals, 66, 68, 70, 99
 Multiple-Direction Markings, 67, 73, 78
 Multi-Way Supplement Plate, 210

 Narrow Bridge Sign, 183
 Narrow Road Ahead Sign
 National Route Marker, 211
 Next Exit Sign, 187
 Next Service Sign, 187
 Night Speed Limit Sign, 192
 No-Cycling Sign, 141d
 No Entry for All Motor Vehicles Sign, 190
 No Entry for All Motor-Vehicles Except Motor-

Cycles W/O Sidecars Signs, 190
 No Entry for Bicycles Signs, 192
 No Entry For ... Signs, 194, 198
 No Entry for Goods-Carrying Vehicles Signs, 192
 No Entry for Goods Carrying Vehicles Exceeding ... Tons Laden Weight Signs, 190, 192
 No Entry for Motor Vehicles Signs, 192
 No Entry for Pedal Cyclists, Signs, 190
 No Entry for Power Drawn Vehicles Sign, 139
 No Entry for all Vehicles Signs, 37, 190
 No Entry for Vehicles Having an Axle Weight Exceeding ... Tons Signs, 190
 No Entry for Vehicles Having Overall Height Exceeding ... Metres (... feet), 191, 192
 No Entry for Vehicles Having Overall Width Exceeding Metres (... feet) Signs, 190, 192
 No Entry for Vehicles Exceeding ... Tons Laden Weight Sign, 191
 No Entry Sign, 77, 133,



136, 139, 145, 152, 194, 214
 No Left/Right Turns Signs, 136, 140, 141, 145, 148, 194
 No Overtaking Signs, 191
 No Parking ... " Sign, 198
 No Parking Except on Shoulders Sign, 192
 No Parking on Pavement, Signs, 192
 No Parking on This Side on Even Days Sign, 198
 No Parking Signs, 31, 50, 191
 No-Passing Markings, Signs, 56, 157
 No Passing Signs, 137, 208
 No Passing Zone Signs, 112, 149
 No Stopping Signs, 49, 50, 192
 Notice-Boards, 18, 19
 No Through Road Sign, 117, 120, 188
 No Trucks Signs, 148, 192, 198
 No Turn Signs, 145, 149, 198
 No U Turn Signs, 140, 145, 148, 194
 Non-Flashing Lights, 99, 100
 Non-Flashing Signals, 99
 Non-Flashing Traffic Signals

Non-Sign Markings, 174
 Nun Buoy, 169

 Object Markings, 68, 71, 74, 156
 Objects-Adjacent to Roadway, 79
 Objects-End of Roadway, 79
 Objects-within Roadway, 78
 Oblique Crossings
 Oblique Parallel Lines, 73, 78, 164, 166
 Obstacle Markings, 74
 Obstruction Markings, 74, 78, 161, 162, 166
 Off-Road Facilities Sign, 212
 One-Lane Bridge Sign, 184
 One-Mile Advance Sign, 187
 One-Way Road Signs, 22, 124, 188
 One-Way Road or Entry Prohibited Sign, 189
 One-Way Signs, 50, 130, 137, 190, 192, 210, 211, 213
 One-Way Transition Signs, 130
 Opening Bridge Sign, 183, 184
 Other Dangers Signs, 30, 37, 67, 71, 72, 110, 181, 183, 185
 Other Markings, 155, 156, 157, 166
 Other Moving Objects Signs,
 Other Signs, 37, 127

- Other Signs Providing Useful Information for Drivers of Vehicles, 118, 188
- Overtaking by Goods Vehicle Prohibited Signs, 77, 134, 145, 194
- Overtaking Prohibited Signs, 77, 134, 137, 190, 192, 194
- Overtaking Signs, 32, 198
- Parking and Stopping Signs, 148, 192
- Parking and Waiting Prohibition Signs, 22, 23, 137
- Parking Areas Signs, 124, 187
- Parking Lines, 162
- Parking Markings, 157
- Parking Prohibited Signs, 122, 137, 188, 189, 193
- Parking Restricted Signs, 158
- Parking Signs, 23, 31, 33, 49, 51, 122, 135, 149, 186, 188, 203, 207, 215
- Partially-Lighted TCDs, 67
- Pass With Care Sign, 130, 192
- Pass This Side, 78, 134, 193
- Passage of Certain Classes of Vehicle Prohibition Signs (MV, MC, All V.), 189
- Passing Markings, 167
- Passing Signs, 72
- Passing W/WO Stopping Prohibited (Customs) Signs, 193
- Pavement Edge Lines, 56
- Pavement Marks, 156
- Pavement Markings, 17, 20, 39, 42, 56, 57, 58, 71, 90, 103, 154, 155, 156, 157, 159, 162, 165, 173
- Pavement-width Sign, 106
- Pedal Cycles Prohibited Signs, 189, 197
- Pedestrian Crossing Signs, 76, 109, 112, 117, 118, 183, 184, 185, 186, 188, 194, 198, 203, 207, 211
- Pedestrian Crossing Control Sign, 127
- Pedestrian Crossing-Markings, 57, 166
- Pedestrian Lines, 78
- Pedestrian Markings, 161
- Pedestrian Prohibited Signs, 149, 192
- Pedestrian Signs, 120
- Pedestrian Signals, 54, 66, 69, 93, 95, 97, 98, 99, 100, 101, 102
- Periodic One-Way Signs, 130
- Permissive Parking Signs, 211, 212
- Permissive Parking Regulatory Signs, 211
- Petroleum Signs, 122
- Picnic Goods Signs, 122

- Pictorial Signs,
- Physical Conditions Signs, 75
- Place Identification Signs,
117, 119, 203, 209
- Place Names Signs, 51, 116
187
- Place Signs, 186
- Place and Direction
Signs, 22
- Place & Route Identification
Signs, 33, 36, 39, 50, 51,
186, 187, 213
- Pre-Selection Signs, 117
- Prevention Signs, 104
- Priority for Oncoming
Traffic Signs, 194
- Priority of Passage Signs, 30
- Priority of Road Signs, 194
- Priority of Road Ahead
Signs, 184
- Priority Over Oncoming
Traffic Signs, 194
- Priority Road Signs, 33, 37,
38, 133, 144
- Priority Signs, 51, 67, 72, 75,
127, 132, 143, 144, 152,
181, 186, 194, 209, 210
- Priority Signs at Intersections,
132, 143, 144
- Priority Signs on Narrow
Sections of Roads, 144
- Programmable Markings, 66
- Prohibition and Restrictive
Signs, 67
- Prohibition of Parking
Signs, 49
- Prohibition of Passing
Without Stopping Signs,
77, 146,
- Prohibition of Turning Signs,
77
- Prohibition of the Use of
Audible Warning
Devices, 146
- Prohibition Signs, 22, 135,
145
- Prohibition of Overtaking
(Or Passing) Signs, 134,
145
- Prohibitive Signs, 152
- Prohibitive and Restrictive
Signs, 127
- Prohibition and Restriction
of Entry Signals, 135
- Prohibitory or Restrictive
Signs, 77, 143, 144
- Prohibitive or Restrictive
Signs, 181, 194, 215
- Prohibitive or Restricting
Standing & Parking
Sign, 78
- Prohibitive with Flashlight
sign, 52, 55
- Prohibitory and Mandatory
Signs, 25, 29, 30, 34, 49,
51, 126 [both have sign],
127, 128, 143, 191, 209,
213
- Prohibitory or Restrictive
Signs, 72,

- Prohibitory or Mandatory Signs, 34, 126, 181, 189
- Prohibitory or Restrictive Signs, 77
- Prohibitory Signs, 24, 25, 31, 45, 46, 49, 50, 72, 75, 145, 146, 149, 181, 189, 190, 214
- Quay Signs, 109
- Rail Signals, 65
- Raised Pavement Markers 155
- Railway Crossbuck Signs, 41, 149, 185, 201, 207, 208
- Railway Crossing Signals, 70
- Railway Crossing Grade Signs, 211
- Railway Crossings Signs, 41
- Railway (Level/Grade) Crossing Sign, 77
- Railway Signals, 169
- Railway Signs, 169
- Ramp-Control Signals, 67, 70, 102
- Ramp Speed Limit Sign, 112
- Rank for Taxi Signs, 186
- Recreational and Cultural Guide and Informational Signs, 211
- Recreational Area Guide Signs, 208
- Recreational Areas Service Signs, 124
- Reflective Buttons, Reflective Devices
- Reflectors, 39, 57
- Reflector Markers, 156
- Reflective Markers, 159
- Regulation Ahead Sign, 75
- Regulatory Signs, 22, 36, 45, 46, 67, 72, 74, 75, 76, 77, 84, 87, 103, 114, 122, 126, 127, 128, 129, 130, 131, 132, 136, 138, 140, 141, 142, 143, 147, 149, 150, 151, 152, 174, 181, 189, 198, 205, 207, 208, 209, 210, 211, 212, 214, 215
- Regulatory Signs Other Than Priority, Standing & Parking, 133, 193
- Regulatory Signs Other Than Priority, Stopping & Parking, 133
- Regulatory Signs Other Than Standing & Parking, 126, 132, 181, 194
- Rest and Information Signs, Signs, 187
- Rest Signs, 124
- Restaurant Signs, 122, 125
- Restricted Parking Sign, 192

- Restricted Stopping Signs, 37
- Restricted Stopping and Waiting Signs, 191
- Restriction Markings,
- Restriction Signs, 43, 191
- Reverse Curve Signs, 184
- Reverse Turn Signs, 184
- Reversible Flow Sign, 130
- Ridge Sign, 109
- Right-of-Control Sign, 127
- Right of Way, 212
- Right Turn Sign, 149
- Riverbanks Signs, 109
- Road Closed Signs, 51
- Road Closed ... Miles Ahead, 194
- Road Closed to All Vehicles Signs, 22, 33
- Road Direction Confirmation Signs, 123
- Road Diversion (Detour) Signs, 105
- Road Edge Markings, 57
- Road End in Junction W. Another Road, 181, 183
- Road for Motor Vehicles Sign, 121, 188
- Road Guide Signs,
- Road Identification Signs, 73, 119, 123
- Road in Which Another Road Ends at a Junction, 183
- Road Intersection Sign, 183, 184, 196, 197
- Road Leading Onto Quay or River Bank Signs, 76, 185
- Road Markers, 41, 57
- Road Markings, 21, 47, 71, 103, 153, 154, 156, 157, 158, 159, 161, 167
- Road Names Signs,
- Road Narrows Dangerously Signs, 184
- Road Narrows Signs, 130, 184, 186
- Road Open or Closed Signs, 121, 188
- Road Signals, 17, 21, 47, 48, 65, 81, 82, 122, 135, 147, 154
- “Road Signals” (Signs), 21
- Road Signs, 17, 20, 23, 24, 27, 29, 34, 44, 47, 48, 65, 81, 82, 85, 122, 135, 147, 153, 154, 159, 177
- Road Surface Markings, 154, 158, 173
- Road to be Taken by Cycles, 190
- Road Use Control Signs, 75, 127, 212
- Road Works, 183, 184, 185
- Roadwork (Construction) Signs, 208
- Roadway Alignment Signs, 67, 71, 74, 75, 76, 108

Roadway & Environment
Signs,
Roadway & Environs Signs,
71, 74
Roadway Conditions Signs,
67, 71, 72, 76, 108
Robots, 52, 55
Roundabout Signs, 113, 147
Route Identification Signs,
123
Route Markers, 39, 41, 51,
67, 73, 115, 124, 125,
187, 195, 199, 208,
210, 212, 213
Rule of the Road Signs, 105

Safety Aids, 97, 155, 173,
174
Saint Andrew's Cross, 201,
207
Sanitary Facilities Signs, 125
School Ahead Sign, 212
School Crossing Signs, 185,
208
School Entrances Signs, 30
School Sign, 185, 211
Scenic Signs, 124
Second Stage Sign, 186
Selective Exclusion Sign, 198
Service Signs, 124, 125, 185,
212
Sharp Bend Signs, 29
Sharp Turning Sign, 186
Sharp Turns Notice-Boards,
Sharp Turns Signs, 20, 196



177, 178, 179, 180, 198,
208, 209, 210, 212
Signs and Markings, 76
Signs at Railway/Level Crossings,
27, 28
Signs for Intersections
72
Signs for Narrow Sections
of Roads, 72
Signs Giving Definite
Information, 126,
181
Signs Giving Definite
Instructions, 22, 30, 36,
37, 127, 181, 189, 190
Signs Giving General
Information, 115, 120,
121, 186, 187
Signs Giving Indications
Only, 23, 114, 180
Signs Giving Notice of
Facilities Which May be
Useful for Road Users,
73, 121, 188, 204, 207
Signs Indicating an
Obligation, 23, 126,
181
Signs of General
Information, 120
Signs of General Interest,
67, 73
Signs of Preparation, 84
Signs of Standardization, 84
Signs of Warning, 103
Signs Prohibiting or
Restricting Standing
and Parking, 188
Signs Prohibiting Passage
Signs, 126, 136, 181,
189
Signs Providing Useful
Information, 122
Signs Providing Useful
Information for
Drivers of Vehicles, 73
120, 180, 204, 207
Signs Providing Useful
Information on Parking,
188
Signs to be Placed in the
Immediate Vicinity of
Level Crossings, 77
Signs with Single Forms, 68
Signs with Variant Forms,
68
Single Bend Signs, 29
Single Forms, 72
Slippery Road Signs, 76,
184
Slow Warning Signs, 41
Slower Traffic Keep Right
Sign, 130, 192
Snow Chains Compulsory
Sign, 78, 193
Sound Traffic Signals, 68
Special Identification of
Route Signs, 39
Special Signals, 66, 69
Special Traffic Signals, 99
Speed Limit Beacons, 75

- Speed Limits Signs, 72, 77, 122, 146, 150, 190, 191, 192, 210, 214
- Speed-Limits Signs, 32
- Speed Regulation Signs, 151, 211
- Standard Signals, 66, 69
- Standard Traffic Signals, 69, 70
- Standing and Parking Markings, 73, 155
- Standing and Parking Regulations Markings, 159
- Standing and Parking Signs, 67, 72, 73, 114, 122, 127, 134, 143, 181, 188, 193
- Steady-Burning Electric Lamps, 67, 76
- Steep Grades Sign, 24
- Stop at Intersections Signs, 191
- Stop (Customs) Sign, 91
- Stop & Go Signs, 51
- Stop Lines, 58, 78, 156, 161, 166
- Stop-lines, 56
- Stop Near Customs Officier Sign, 190
- Stop on Red Sign, 211
- Stop-Signal for Scholar Patrol, 191
- Stop Signs, 37, 39, 41, 49, 66, 86, 87, 91, 107, 111, 118, 127, 128, 129, 131, 132, 133, 143, 147, 148, 149, 151, 152, 161, 170, 172, 178, 191, 192, 194, 208, 209, 210, 212, 213, 214, 215
- Stop Sign Ahead, 184, 185, 190, 197
- Stop Sign Beacon, 75
- Stopping & Parkings Markings
- Stopping and Parking Signs, 134
- Stopping & Parking Regulations (?)
- Stopping & Signals (?),
- Stopping Prohibited Sign, 190
- Street Names Signs, 124, 125, 187, 211
- Surface & Above-Surface Non Sign Markers, 155
- Surface Markings, 56, 71, 73, 79, 154, 157,
- Swing Bridge Signs, 76, 109, 185
- Swingbridge Signals, 70
- Switch Signals, 63
- “T” Symbol Sign, 184
- Tab Signs, 209
- TCD, 15, 16, 17, 26, 40, 42,

- 39, 41, 43, 45, 46, 48, 53,
56, 59, 70, 71, 75, 79, 80,
81, 82, 83, 84, 85, 86, 87,
88, 89, 90, 91, 92, 94, 95,
103, 104, 105, 106, 111,
112, 114, 116, 127, 128,
129, 130, 150, 152, 154,
169, 170, 172, 174, 178
180
- Telephone Signs, 122
- Temporary Conditions
Signs, 186, 212,
- Temporary Road Signs, 51
- Temporary Warning Signs
for Construction, 71
- Temporary Warning Signs
for Construction and
Maintenance Signs, 71,
72
- T-Junction Sight Board, 211
- T-Junction Sign, 186
- Tourist Information Office
Sign, 123
- Tourist Signs, 122
- Tow Trucks, 125
- Trackside Signals, 62, 63
- Traffic Aids, 53
- Traffic Beacons, 68, 70,
99, 100, 172, 173
- Traffic Circle, L, R, 184
- Traffic Congestions Signs,
113
- Traffic Control Signals,
66, 95
- Traffic Lane Markings, 56,
78, 160, 164
- Traffic Light Signals, 134
- Traffic Light Signs, 52,
55, 94
- Traffic Markings, 15, 42, 53
54, 56, 57, 71, 79, 80, 81,
83, 95, 153, 154, 155,
158, 159, 162, 170, 172,
173
- Traffic Signals, 15, 21, 39
42, 45, 51, 53, 54, 55, 60,
61, 63, 66, 68, 69, 70, 75,
79, 80, 81, 83, 93, 94, 95,
96, 97, 98, 99, 169, 172,
173
- Traffic Signs, 15, 18, 19, 27,
39, 42, 44, 45, 53, 54, 60,
61, 62, 65, 79, 80, 81, 83,
93, 95, 169, 170, 173,
177, 180
- Trailblazer, 187
- Trains Signs, 123, 147
- Tram Stop, 186
- Tramway Signs, 110, 118,
125, 147
- Transverse Markings, 67, 73,
78, 155, 156, 157, 159,
160, 166,
- Trolley-Bus Signs, 33
- Trolley Signs, 147
- Truck Excluded Signs, 192,
198
- Truck Lane ... Feet, 192
- Truck Route Signs, 150
- Truck Use Right Lane Signs,

192
Turning Movements Signs,
156
Turn Prohibition Signs, 149
Turn Signs, 66, 72, 184
Turning Prohibited Signs,
37, 192
Turning to the Right/Left
Prohibited Sign, 137,
190, 192
Two-mile Advance Sign,
187
Two-Part Signs, 44, 48
Two-way Traffic Signs, 76,
77, 111, 185, 192

Uneven Road Signs, 20, 76,
181, 183, 196
Uneven Road (Bump, Dip,
Rough Road) Sign, 184,
185
Unguarded Level-Crossing
Sign, 183
Unitary Markings, 65
Unlighted Aids, 71
Unlighted TCD Signs &
Markings, 67
Unlighted Traffic Signs and
Traffic Markings, 70
U-Turns Signs, 130
Unlighted Signs, 76, 172
Unlighted Markings, 71
Uphill Traffic Sign, 130
Use of Audible Warning
Devices Prohibited Signs,

77, 193
Vehicle Prohibited for Play
Street, 214
Vertical Markings, 68, 73,
74, 78, 79, 193
Visual Aids, 71

Waiting on Alternate Sides
Signs, 191
Waiting Prohibited Signs, 23,
49, 189, 190, 197
Waiting Prohibition Signs
Waiting Signs, 31, 37, 137
Walk on Left Sign, 194
Warning & Informative
Signs, 25
Warning Beacons, 75
Warning Cross Signs, 52,
57
Warning for Intersection
Signs, 109
Warning Lights, 67, 76
Warning Lines, 165
Warning of Intersections
with Tramway Line Signs,
77
Warning of Level Crossing
with Gates or Half-Gates
Signs, 77
Warning of Other Level
Crossings Signs, 77
Warning Signs, 24, 36, 39, 40,
45, 46, 50, 62, 67, 71, 74,
75, 76, 77, 84, 86, 87, 91,

103, 104, 105, 106, 107,
108, 109, 110, 111, 112,
113, 114, 115, 116, 126,
130, 147, 149, 170, 174,
180, 181, 196, 205, 207,
208, 209, 210, 211, 212,
213, 214, 215
Warning Signs At Approach
to Intersections Signs, 71
Warning Signs-Sharp Bends,
64
Weigh Station Sign, 210
Weight-Limit/Weight Limit
Signs, 189, 194, 197
Weight Sign, 31
Width Markers, 211
Winding Road Sign, 184
Word Markings, 78, 162, 167
Wrong Way Sign, 210

"Y" Symbol Sign, 184
Yield Ahead Signs, 106, 184
Yield Right of Way at
Intersection Sign, 133
Yield Lines. 78, 161
Yield Right of Way Sign, 131
Yield Signs, 28, 51, 127, 130,
143, 148, 151, 152, 185,
192, 208, 209, 214
Yield Sign Ahead, 119
Youth Hostel Sign, 119

Zebra Crossing, 156