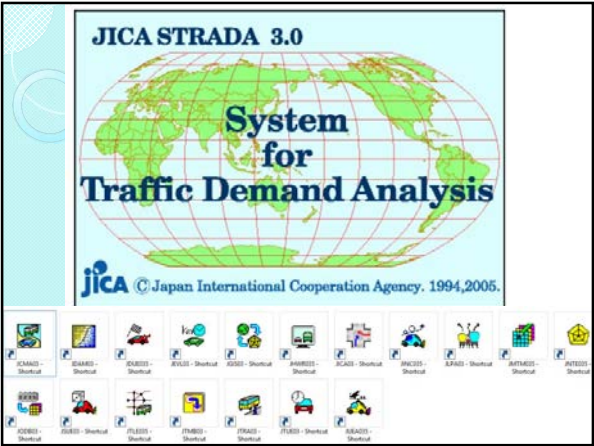


ໂຄງການບັບປຸງການຂົນສົ່ງສາທາລະນະໃນຕົວເມືອງ
ນະຄອນຫຼວງວຽງຈັນ, ອົງການຮ່ວມມືສາກົນ
ຮ່ວມມື PEC-VCSBE
ການຝຶກອົບຮົມການວິເຄາະຂໍ້ມູນດ້ານວິສະວະກໍາ
ຈະລາຈອນແລະຂົນສົ່ງໂດຍການນໍາໃຊ້ໂປຼແກຼມ
STRADA 3.5
ບໍລິສັດ Katahira ແລະວິສະວະກໍາສາກົນຈໍາກັດ
(KEI) Tokyo, Japan



ລາຍຊື່ທີ່ປຶກສາ

ຊື່ວຽກ	ລາຍຊື່	ບໍລິສັດ
ທົດສອບທຳມະຊາດການຄົມມະນາຄົມຂົນສົ່ງສາທາລະນະ	TODA Toshinori	KEI
ຮອງຫົວໜ້າໃນງານການໃຫ້ບໍລິການລົດເມ/ການພັດທະນາຊັ້ນພະຍາກອນມະນຸດ 2	KUNIMASA Yoshiro	KEI
ການບໍລິຫານອົງກອນການບັນຊີ	SHIMEGI Natsuki	KEI (Ernst&Young)
ເສັ້ນທາງລົດເມ ແລະ ການດໍາເນີນງານ	MURAKAMI Tadaaki	KEI (Tostems)
ການໃຫ້ບໍລິການລົດເມ/ການພັດທະນາຊັ້ນພະຍາກອນມະນຸດ 1	MISHIMA Ai	KEI
ການຄຸ້ມຄອງ ແລະ ປ່າລຸງຮັກສາຍານພາຫະນະ	KOBAYASHI Kiyohito	KEI
ຂ່າງກົນຈັກ	MURATA Minoru	KEI (Product M)
ແຜນການຈາລະຈອນ ແລະ ຂົນສົ່ງ	YASHIRO Shuichi	KEI
ແຜນສຳນວນຄວາມສະດວກດ້ານການຄົມມະນາຄົມຂົນສົ່ງ	MIYAKAWA Akiko	KEI
ທີ່ປຶກສາຈາກບໍລິສັດລົດເມ	ສະມາຊິກຈາກບໍລິສັດລົດເມ Keisei ຈໍາກັດ	KEI (Keisei Bus)

ການຝຶກອົບຮົມການວິເຄາະຂໍ້ມູນດ້ານວິສະວະກໍາຈະລາຈອນ ແລະ ຂົນສົ່ງໂດຍການນໍາໃຊ້
ໂປຼແກຼມ STRADA 3.5
ຄວາມຮູ້ພື້ນຖານດ້ານວິສະວະກໍາຈະລາຈອນ ແລະ ຂົນສົ່ງ
ພົງສະຫວັນອິນທະວົງສາ
ຫຼ່ວຍງານຂົນສົ່ງ, ພາກວິຊາວິສະວະກໍາຂົວ-ທາງ ແລະ ຂົນສົ່ງ

- ສາລະບານ**
- I. ຄວາມຮູ້ພື້ນຖານດ້ານວິສະວະກໍາຈະລາຈອນ ແລະ ຂົນສົ່ງ
 - II. ການສຶກສາປະລິມານການຈະລາຈອນ
 - III. ການຈັດການລະບົບການຈະລາຈອນໃນຕົວເມືອງ
 - IV. ການວາງແຜນການຂົນສົ່ງ

ຄວາມຮູ້ພື້ນຖານດ້ານວິສະວະກໍາຈະລາຈອນ ແລະ ຂົນສົ່ງ

1.1. ວິສະວະກຳຂົນສົ່ງແມ່ນຫຍັງ?

ວິສະວະກຳຂົນສົ່ງຄື: ການປະຍຸກຫຼັກການທີ່ເປັນວິທະຍາສາດ ແລະ ເທັກໂນໂລຢີດ້ານການຂົນສົ່ງເຂົ້າດ້ວຍກັນເພື່ອການ ວາງ ແຜນ, ການອອກແບບ, ການປະຕິບັດ ແລະ ບໍລິຫານ ຈັດການ ໂຄງສ້າງພື້ນຖານຂອງລະບົບຂົນສົ່ງປະເພດຕ່າງໆທີ່ໃຊ້ໃນ ການເຄື່ອນຍ້າຍຄົນ ແລະ ສິ່ງຂອງທີ່ເພື່ອໃຫ້ເກີດຄວາມ ປອດໄພ, ສະດວກສະບາຍ, ປະທັບດວດາ ແລະ ບໍລິສົນ ກະທົບຕໍ່ສິ່ງແວດລ້ອມ

1.2. ວິສະວະກຳຈະລາຈອນແມ່ນຫຍັງ?

ວິສະວະກຳຈະລາຈອນຄືສາຂາໜຶ່ງຂອງວິສະວະກຳຂົນສົ່ງທີ່ກ່ຽວຂ້ອງ ກັບການວາງແຜນ, ການອອກແບບທາງດ້ານເລຂາຄະນິດ ແລະ ການ ຄວບຄຸມກະແສການຈະລາຈອນຂອງສູນທາງສາຍຫຼັກ, ສາຍສ່ຳຮອງ, ທາງຫຼວງ, ຕາໜ່າງເສັ້ນທາງ, ສະຖານີ, ພື້ນທີ່ອັອມຮອບເສັ້ນທາງ ແລະ ຄວາມສຳພັນລະຫວ່າງການຂົນສົ່ງປະເພດຕ່າງໆທີ່ມາຳນຳໃຊ້ເສັ້ນທາງ ຮ່ວມກັນ. ນອກຈາກນີ້ວິສະວະກຳຈະລາຈອນຍັງວອມເຖິງການສຶກສາພຶກຕີ ກຳການໃຊ້ລົດໃຊ້ເສັ້ນທາງຂອງຜູ້ເດີນທາງ, ຄວາມສຳພັນລະຫວ່າງ ລັກສະນະຂອງເສັ້ນທາງ ແລະ ພຶກຕີກຳຂອງຜູ້ຂັບຂີ່ ແລະ ຄວາມ ສຳພັນກັນລະຫວ່າງຍານພາຫະນະແຕ່ລະຄັນໃນກະແສຈະລາຈອນ

1.3. ອົງປະກອບຂອງການຈະລາຈອນ

ການແກ້ໄຂບັນຫາການຈະລາຈອນຕິດຂັດນັ້ນຂຶ້ນຢູ່ກັບອົງ ປະກອບ ຂອງການຈະລາຈອນ 3 ຢ່າງດ້ວຍກັນຄື:

- ຄົນຂັບ ແລະ ຄົນຢ່າງ (Driver and Pedestrian),
- ພາຫະນະ (Vehicle)
- ເສັ້ນທາງ (Road)

ຄົນນັບວ່າເປັນອົງປະກອບໜຶ່ງທີ່ສຳຄັນໃນການສ້າງບັນຫາໃຫ້ ແກ້ການ ຈະລາຈອນ ຫາກວ່າບໍ່ສາມາດຄວບຄຸມແນະນຳ ແລະ ບັງຄັບໃຫ້ ຄົນ ຂັບປະຕິບັດຕາມລະບຽບຕ່າງໆຂອງການຈະລາຈອນໄດ້ແລ້ວ ຍອມລະ ກໍ່ບັນຫາຄວາມສັບສົນໃນການນຳໃຊ້ເສັ້ນທາງ.

1.3.1. ລັກສະນະຂອງຜູ້ຂັບຂີ່ຍານພາຫະນະ

ສາມາດແຍກບັນຫາທີ່ເກີດຈາກຄົນຂັບລົດໄດ້ 2 ປະການ ດ້ວຍກັນຄື:

- ມາລາຍາດ ຫຼື ວິໄນໃນການຂັບຂີ່ ແລະ ການຕັດສິນໃຈ ສະເພາະໜ້າ
- ມາລະຍາດ ຫຼື ວິໄນໃນການຂັບຂີ່
 - ການຂາດຄວາມຮູ້ເລື່ອງການຈະລາຈອນ
 - ການບໍ່ສົນໃຈປະຕິບັດຕາມກົດລະບຽບຈະລາຈອນ
 - ບັດໃຈທາງດ້ານກາຍະພາບ ແລະ ຈິດໃຈທີ່ຜິດ ບົກກະຕິ
 - ເສບຢາ ແບບຕິດ ຫຼື ເຄື່ອງດື່ມມືນເມົາຕ່າງໆລະຫວ່າງ ຂັບຂີ່ພາຫະນະ

1.3.1. ລັກສະນະຂອງຜູ້ຂັບຂີ່ຍານພາຫະນະ (ຕໍ່)

- ການຕັດສິນໃຈສະເພາະໜ້າ ການຕັດສິນໃຈສະເພາະໜ້າກໍ່ເປັນທີ່ມາຂອງການເກີດ ອຸປະຕິເຫດໄດຍ ກົງ. ໂດຍທົ່ວໄປແລ້ວຈະມີໄລຍະການຕັດສິນໃຈ (Perception, Intellection, Emotion, Volition = PIEV) ປະມານ 1-2 ວິນາທີ. ສຳລັບຕາມມາດຕະຖານການອອກແບບ ທາງການຈະລາຈອນ ຊຶ່ງ AASHTO (American Association of State Highway and Transportation Officials) ກຳນົດຄ່າ PIEV ໄວ້ເທົ່າກັບ 2-2.5 ວິນາທີ

1.4. ລັກສະນະຂອງເສັ້ນທາງ

ຕາມແນວຄວາມຄິດຂອງວິສະວະກອນໃນອາດິດຈະຄຳນຶງເຖິງໂຄງ ສ້າງ ຄວາມແຂງແຮງເທົ່ານັ້ນແຕ່ **ໃນຫຼັກວິສະວະກຳຈະລາຈອນຈະຄຳນຶງ ເຖິງ ຄວາມສະດວກ, ຄວາມໄວ, ຄວາມປະທັບດ ແລະ ປອດໄພ ດ້ວຍວິທີ ການອອກແບບທາງໂດຍອາດິດຂອງໃສ່ຫຼັກເລຂາຄະນິດ (Geometric Design) ໃນການອອກແບບເຊັ່ນ:**

- ຄວາມສາມາດໃນການຮອງຮັບປະລິມານການຈະລາຈອນຕາມທີ່ ຄາດຄະເນ
- ການໃຫ້ຄວາມປອດໄພ ແລະ ກໍ່ໃຫ້ເກີດຄວາມໝັ້ນໃຈຕໍ່ຜູ້ຂັບຂີ່
- ບໍ່ຄວນໃຫ້ເກີດການປ່ຽນແປງຢ່າງກະທັນຫັນຂອງການວາງແລວ ທາງ ທາງໂຄງ, ຄວາມໝັ້ນຕະຫຼອດຈົນໄລຍະແນວເຫນືອຂອງ ສາຍຕາ
- ຄວນຄຸ້ມຄອງຄວາມປະທັບດໃນການກໍ່ສ້າງຕະຫຼອດຈົນການ ບາດຊຸກສາເສັ້ນທາງ

1.5.ລັກສະນະຂອງລົດ (Vehicle Characteristics)

ລົດບັນທຶກປະກອບໜຶ່ງທີ່ສຳຄັນເຊິ່ງຄວາມສຳຄັນຂອງລົດນອກຈາກຈະມີສະພາບຈັກທີ່ສາມາດຂັບຂີ່ໃນທາງໄດ້ຢ່າງປອດໄພໂດຍມີອຸປະກອນການໃຫ້ສັນຍານແລະອຸປະກອນການຂັບຂີ່ທີ່ສົມບູນແລ້ວໃນທາງ **ວິສະວະກຳ** ຈະວາຈອນຍັງນຳຂໍ້ມູນຂອງລົດໄປພິຈາລະນາວາງແຜນແລະອອກແບບສົ່ງອ່ານອອກຄວາມສະດວກຕ່າງໆ ຈົນສະເໜີຂໍ້ບັງຄັບແລະ ວິທີການຄວບຄຸມການຈະວາຈອນອີກດ້ວຍ. ລັກສະນະໂດຍທົ່ວໄປຂອງລົດທີ່ມັກວິສະວະກອນຄວນຮູ້ປະກອບມີຢູ່: ລັກສະນະຄື:

- ລັກສະນະທາງ Statics (ຂະໜາດ ແລະ ນ້ຳໜັກຂອງລົດ)
- ລັກສະນະທາງ Kinematics (ໄລຍະທາງ, ຄວາມໄວ ແລະ ອັດຕາເລັ່ງ ທີ່ໃຊ້ໃນການເຄື່ອນທີ່ເປັນຕົ້ນ)
- ລັກສະນະທາງ Dynamics (ບັນດາຂອງຕ່າງໆທີ່ກະທຳໃສ່ລົດ)

1.6.ໄລຍະແນມເຫັນ (Sight Distance)

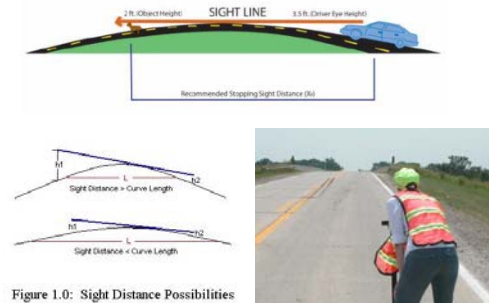


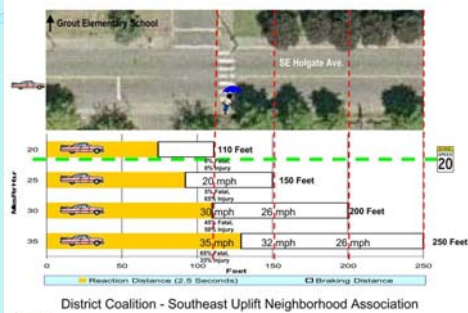
Figure 1.0: Sight Distance Possibilities

1.6.ໄລຍະແນມເຫັນ (Sight Distance) (ຕໍ່)

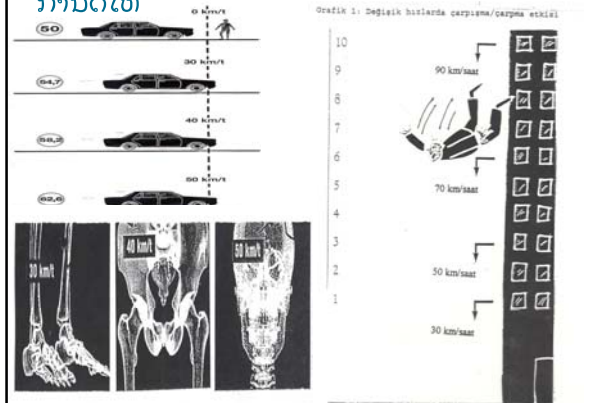


1.6.ໄລຍະແນມເຫັນ (Sight Distance) (ຕໍ່)

EFFECTS OF SPEED ON STOPPING DISTANCE



ຜົນກະທົບຈາກການແລນລດເກນຄວາມໄວທຳນົດໃຫ້



ຕາຕະລາງໄລຍະຢຸດ ແລະ ໄລຍະແຊງທີ່ປອດໄພ (Stopping and Passing Sight Distance)

Design Speed (km/h)	Brake ¹ Reaction Distance (m)	Brake ² Distance On Level (m)	Design Stopping Sight Distance (m)
30	20.9	10.3	35
40	27.8	18.4	50
50	34.8	28.7	65
60	41.7	41.3	85
70	48.7	56.2	105
80	55.6	73.4	130
90	62.6	92.9	160
100	69.5	114.7	185

Design Speed (km/h)	Design Passing Sight Distance (m)
30	200
40	270
50	345
60	410
70	485
80	540
90	615
100	670

Notes:

1. Brake reaction distance based on a time of 2.5 s.
2. Driver deceleration based on a rate of 11.2 ft/s² (3.4 m/s²).

ຕົວຢ່າງ: ບົດລົງໂທດ, ການບັບໄໝ, ການຕັດຄະແນນ ແລະ ການຍືດໃບອະນຸຍາດຂັບຂີ່ຢູ່ຕ່າງປະເທດ

ຕາຕະລາງທີ 1. ຕົວຢ່າງໃນສໍາເລັດການທີ່ຂີ່ລົດໄວກິໂລແມັດທີ່ຈຳເປັນຕາມກົດໄດ້ໃນລະດັບເລີກະໂນ: (Singapore Police Force)

ຄວາມໄວສູງກວ່າຄວາມໄວທີ່ອະນຸຍາດ	ລັດຖະທຳມະນູນ	ລັດຖະທຳມະນູນ	ຈັດຮຽນ		
1-20 ກມ/ຊົ່ວ	SGOS 130	834,470 ກີບ	SGOS 160	1,027,040 ກີບ	4 ຄະແນນ
21-30 ກມ/ຊົ່ວ	SGOS 150	962,850 ກີບ	SGOS 180	1,155,420 ກີບ	6 ຄະແນນ
31-40 ກມ/ຊົ່ວ	SGOS 170	1,091,230 ກີບ	SGOS 200	1,283,800 ກີບ	8 ຄະແນນ
41-50 ກມ/ຊົ່ວ	ສິດສານ				12 ຄະແນນ
51-60 ກມ/ຊົ່ວ	ສິດສານ				18 ຄະແນນ
60 ກມ/ຊົ່ວ ຫຼື ສູງກວ່າ	ສິດສານ				24 ຄະແນນ

ສາມາດເອົາຄວາມໄວ 1SGOS ເທົ່າກັບ 6.419 ກີບ (ໃນທີ 21/02/2014)

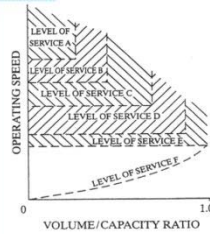
ຕາຕະລາງທີ 2. ຕົວຢ່າງໃນສໍາເລັດການທີ່ຂີ່ລົດໄວກິໂລແມັດທີ່ຈຳເປັນຕາມກົດໄດ້ໃນລະດັບເລີກະໂນ (F-ibaraki Report)

ຄວາມໄວສູງກວ່າຄວາມໄວທີ່ອະນຸຍາດ	ຄວາມໄວ (km/h)	ຄວາມໄວ (mi/h)	ຈຳນວນ	BAQD (B)	BAQD (C)
15 ກມ/ຊົ່ວ	9,000	692,010	1	7	14
15-20 ກມ/ຊົ່ວ	12,000	922,880	1	7	14
20-25 ກມ/ຊົ່ວ	15,000	1,153,750	2	7	14
25-30 ກມ/ຊົ່ວ	18,000	1,384,620	3	8	15
30-35 ກມ/ຊົ່ວ (ຕາມກົດ)	25,000	1,922,250	6(3)	9(8)	16(15)
35-40 ກມ/ຊົ່ວ (ຕາມກົດ)	35,000	2,691,150	6(3)	9(8)	16(15)
40-50 ກມ/ຊົ່ວ	ສິດສານ		6	9	16
50 ກມ/ຊົ່ວ ຫຼື ສູງກວ່າ	ສິດສານ		13	13	19

ສາມາດເອົາຄວາມໄວ 1km ເທົ່າກັບ 76.8900 ກີບ (ໃນທີ 21/02/2014)

1.7. ລະດັບການໃຫ້ບໍລິການ

ຄຸນນະພາບໃນການສັນຈອນຂອງພາຫະນະຕາມທ້ອງຖະໜົນທີ່ສູງໃດຍຸ່ນ ໃຊ້ຖະໜົນໃນຮູບຂອງຄວາມສະດວກ ຄວາມປອດໄພ ຄວາມໄວ ຕະຫຼອດຈົນ ຄວາມມີສິດສະໜະໃນການຂັບຂີ່ຕາມ ຄວາມໄວທີ່ຕ້ອງການແບ່ງອອກເປັນ 6 ລະດັບ A-F



ລະດັບການໃຫ້ບໍລິການທີ່ພາຫະນະສາມາດເຄື່ອນທີ່ໄດ້ໂດຍອິດສະຫຼະດ້ວຍຄວາມໄວອິດສະຫຼະ (Free flow speed) ຍັງເປັນລະດັບການໃຫ້ບໍລິການທີ່ພາຫະນະສາມາດເຄື່ອນທີ່ໄດ້ໂດຍອິດສະຫຼະ ແລະ ຍັງສາມາດເລືອກໃຊ້ຄວາມໄວໃນການສັນຈອນໄດ້ໂດຍອິດສະຫຼະໄລຍະທາງສະເລ່ຍລະຫວ່າງຍານພາຫະນະຈະມີຄ່າປະມານ 100 ແມັດ
ເປັນລະດັບການໃຫ້ບໍລິການທີ່ສາມາດໃຊ້ຄວາມໄວໃນການສັນຈອນໄດ້ໂດຍອິດສະຫຼະ ຄວາມໄວອິດສະຫຼະໃນການສັນຈອນຈະຖືກຈຳກັດໂດຍພາຫະນະທີ່ຊຶມຊີ້ຕ້ອງໃຫ້ຄວາມລະມັດລະວັງຂະນະເປັນຊ່ອງຈະລາຈອນຫຼາຍຂຶ້ນໄລຍະທາງສະເລ່ຍລະຫວ່າງພາຫະນະມີຄ່າປະມານ 50 ແມັດ
ເປັນລະດັບການໃຫ້ບໍລິການທີ່ສາມາດໃຊ້ຄວາມໄວໃນການສັນຈອນເລີ້ມຫຼຸດລົງລົງກວ່າອຸສະໜະທີ່ປະລິມານການແລະ ຄວາມໜາແໜ້ນເລີ້ມທີ່ຈະເລີນຂຶ້ນຢ່າງຕໍ່ເນື່ອງ ຄວາມໄວອະດີດສະໜະໃນການສັນຈອນຈະແຕກຕ່າງຈາກຈຳນວນຖືກຈຳກັດໂດຍພາຫະນະຂຶ້ນຢ່າງຕໍ່ເນື່ອງເລີ້ມທີ່ຈະເລີນຂຶ້ນໃຫ້ຄວາມລະມັດລະວັງ ແລະ ຕັດຄວາມຄຽດໃນການສັນຈອນເລີ້ມຂຶ້ນ
ເປັນລະດັບການໃຫ້ບໍລິການທີ່ລະດັບສູງສຸດຢູ່ເສັ້ນທາງສາມາດຮອງຮັບປະລິມານການຈະລາຈອນໄດ້ ການຈະລາຈອນເປັນໄປໄດ້ດ້ວຍຄວາມຍາກລຳບາກຊ່ວຍຫຼາຍກວ່າອຸສະໜະທີ່ປະລິມານການແລະ ຄວາມໜາແໜ້ນໂດຍມະນຸດແລະ ຜູ້ບໍລິການບໍ່ໄດ້ກັບຄວາມປອດໄພຂອງລົດ ຄວາມໄວທີ່ເພີ່ມທີ່ໃນການຈະລາຈອນແລະ ປ່ຽນຊ່ອງຈະລາຈອນຫຼາຍລົງ
ເປັນລະດັບການໃຫ້ບໍລິການທີ່ເກີດສະພາບການຈະລາຈອນດິດຂອງກະແສການຈະລາຈອນ

ການສຶກສາປະລິມານການຈະລາຈອນ

2.1. ປະລິມານການຈະລາຈອນແມ່ນຫຍັງ?

ປະລິມານການຈະລາຈອນ (Traffic Volume) ແມ່ນຈຳນວນພາຫະນະທີ່ແລ່ນຜ່ານຕໍ່ເວລາທີ່ກຳນົດ ໂດຍທົ່ວໄປມີ ຫຼັງຈາກທີ່ໄດ້ຮັບຄວາມສະດວກ ຄັນຕໍ່ມື້ ຫຼື ຄັນຕໍ່ຊົ່ວໂມງເປັນຕົ້ນ
ປະລິມານການຈະລາຈອນທີ່ສາມາດນຳໄປໃຊ້ໃນການວິເຄາະແນວໂນ້ມການຂະຫຍາຍຕົວຂອງຄວາມຕ້ອງໄດ້ເສັ້ນທາງຈະຢູ່ໃນຮູບຂອງປະລິມານການຈະລາຈອນປະຈຳວັນ (Daily volume). ປະລິມານການຈະລາຈອນປະຈຳວັນທີ່ມີໃຊ້ໃນການວິເຄາະດ້ານວິສະວະກຳຈະລາຈອນປະກອບມີ 4 ປະເພດດັ່ງນັ້ນຄື:

2.2. ປະເພດຂອງປະລິມານການຈະລາຈອນ

- AADT (Average Annual Daily Traffic) ແມ່ນປະລິມານການຈະລາຈອນສະເລ່ຍໃນ 24 ຊົ່ວໂມງຕໍ່ວັນ ຫຼື ຊ່ອງຖະໜົນທີ່ກຳນົດຕະຫຼອດໄລຍະເວລາ 1 ປີ (365 ມື້) ສາມາດຄົງນວນໄດ້ຈາກການນຳຈຳນວນພາຫະນະທີ່ແລ່ນຜ່ານຕໍ່ວັນ ຫຼື ຊ່ອງຖະໜົນທີ່ກຳນົດໃນໄລຍະເວລາ 1 ປີ ຫານໃຫ້ 365 ມື້
- AAWT (Average Annual Weekday Traffic) ແມ່ນປະລິມານການຈະລາຈອນສະເລ່ຍໃນ 24 ຊົ່ວໂມງທຳມະດາໃນມື້ທີ່ຢູ່ລະຫຼວງອາທິດ (ວັນຈັນ-ວັນສຸກ) ຕະຫຼອດໄລຍະເວລາ 1 ປີ ຫາໄດ້ຈາກການນຳຈຳນວນພາຫະນະທີ່ແລ່ນຜ່ານຕໍ່ວັນ ຫຼື ຊ່ອງຖະໜົນທີ່ກຳນົດຕະຫຼອດວັນ ຫຼື ຊ່ອງຖະໜົນທີ່ກຳນົດໃນໄລຍະເວລາ 1 ປີ ຫານດ້ວຍຈຳນວນມື້ທີ່ຢູ່ໃນຊ່ອງຂອງອາທິດໃນ 1 ປີ (ໂດຍທົ່ວໄປຈະໃຊ້ 260 ມື້)

2.2. ປະເພດຂອງປະລິມານການຈະລາຈອນ (ຕໍ່)

- ADT (Average Daily Traffic) ແມ່ນປະລິມານການຈະລາຈອນສະເລ່ຍໃນ 24 ຊົ່ວໂມງຕໍ່ວັນ ຫຼື ຊ່ອງຖະໜົນທີ່ກຳນົດຕະຫຼອດຊ່ອງເວລາທຳມະດາສາຫຼອດຂໍ້ມູນຊຶ່ງນ້ອຍກວ່າ 1 ປີ
 - AWT (Average Weekday Traffic) ແມ່ນປະລິມານການຈະລາຈອນສະເລ່ຍໃນ 24 ຊົ່ວໂມງຕໍ່ວັນ ຫຼື ຊ່ອງຖະໜົນທີ່ກຳນົດຂອງມື້ລະຫຼວງອາທິດ ຕະຫຼອດຊ່ອງເວລາທຳມະດາສາຫຼອດຂໍ້ມູນຊຶ່ງນ້ອຍກວ່າ 1 ປີ
- ປະລິມານການຈະລາຈອນຕາມທີ່ໄດ້ອະທິບາຍຂ້າງເທິງມີຫົວໜ່ວຍເປັນ ຄັນຕໍ່ມື້ (veh/day) ໂດຍທົ່ວໄປປະລິມານການຈະລາຈອນປະຈຳວັນຈະຜ່ານເປັນຄ່າລວມຕະຫຼອດທັງຊ່ອງຖະໜົນທີ່ສຶກສາຈະບໍ່ຈຳແນກຕາມທິດທາງ ຫຼື ຊ່ອງຈະລາຈອນ

2.2. ປະເພດຂອງປະລິມານການຈາລະຈອນ(ຕໍ່)

- PHV (Peak Hour Volume) ເປັນຄ່າຂອງຈໍານວນພາຫະນະທີ່ຫຼາຍທີ່ສຸດ ຊຶ່ງແລ່ນຜ່ານຈຸດຫຼັກໆ ຕາມເສັ້ນທາງໃນຊ່ວງເວລາຕໍ່ເນື່ອງກັນພາຍໃນ 1 ຊົ່ວໂມງ (60 ນາທີ) ທີ່ສາມາດຄຳນວນໄດ້ຈາກການສຳຫຼວດປະລິມານການຈະລາຈອນໃນແຕ່ລະຊ່ວງເວລາທີ່ຕ້ອງການອາດຈະທຳການສຶກສາໃນຊົ່ວໂມງເລັກໆ ໃນຕອນເຊົ້າແລະ ຕອນແລງມີຫົວໜ່ວຍເປັນຄັນ/ຊົ່ວໂມງຄຳ PHV ໃຊ້ເພື່ອ:
 - ຈຳແນກລະດັບຂອງເສັ້ນທາງໃນການໃຫ້ບໍລິການ
 - ອອກແບບລັກສະນະທາງເລຂາຂະນິດຂອງທາງ(ຈຳນວນຊ່ອງຈາລະຈອນ, ລະບົບໄຟອ້າງນາດແລະກຳນົດເສັ້ນທາງການເດີນລົດ)
 - ການວິເຄາະຄວາມສາມາດໃນການຮອງຮັບປະລິມານການຈາລະຈອນເປັນຕົ້ນ.

2.2. ປະເພດຂອງປະລິມານການຈາລະຈອນ(ຕໍ່)

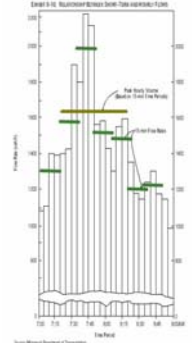
- PHF (Peak Hour Factor) ແມ່ນສໍາຮູດປະລິມານການຈະລາຈອນສູງສຸດໃນຊົ່ວໂມງເລັກໆ ໃດໜຶ່ງ ໃດໜຶ່ງ ປະລິມານຄຳນວນໃນຊ່ວງເວລາ 15 ນາທີ ຂອງຊົ່ວໂມງທີ່ມີປະລິມານການຈະລາຈອນສູງສຸດ ຖ້າ PHF ມີຄ່າໃກ້ 1 ສະແດງວ່າກະແສການຈະລາຈອນໃນຊ່ວງຊົ່ວໂມງ ເລັກໆ ມີຄ່າສະເໝີກະແສການຈະລາຈອນໃນຊ່ວງເວລາ ແລະ ຖ້າ PHF ມີຄ່າໃກ້ 0 ສະແດງວ່າກະແສການຈະລາຈອນໃນຊ່ວງຊົ່ວໂມງເລັກໆ ມີຄ່າອາດມີຄວາມຜັນແປສູງ.

$$PHF = V / 4 \times V15$$

- V ແມ່ນປະລິມານການຈະລາຈອນຕໍ່ຊົ່ວໂມງທີ່ມີຄ່າສູງສຸດ
- V15 ແມ່ນອັດຕາການໄຫຼສູງສຸດໃນຊ່ວງເວລາ 15 ນາທີໃນຊົ່ວໂມງສູງສຸດ

- SF (Service Flow) ແມ່ນອັດຕາການໄຫຼສູງສຸດຂອງກະແສຈະລາຈອນໃນຊ່ວງເວລາ 15 ນາທີ ຂອງຊົ່ວໂມງທີ່ມີປະລິມານການຈະລາຈອນສູງສຸດແຕ່ຂະໜາຍໃຫ້ເປັນປະລິມານການຈະລາຈອນ ຕໍ່ຊົ່ວໂມງ

$$SF = V / PHF$$



2.2. ປະເພດຂອງປະລິມານການຈາລະຈອນ(ຕໍ່)

- Passenger Car Unit (PCU) ເປັນຄ່າສະພາບຄວາມຄ່ອງຕົວຂອງລົດແຕ່ລະປະເພດທຽບກັບລົດນັ່ງສ່ວນບຸກຄົນ ຊຶ່ງຄ່າ PCU ນີ້ມີຄ່າແຕກຕ່າງກັນໄປຕາມສະພາບຂອງເສັ້ນທາງ ແລະ ສະພາບພູມິປະເທດບາງເທື່ອການສະແດງຄ່າປະລິມານການຈະລາຈອນໃດໜຶ່ງໄດ້ຄຳນຶງຖືງສະພາບຄວາມຄ່ອງຕົວຂອງລົດ, ອາດເຮັດໃຫ້ເກີດຄວາມຄາດເຄືອນໄດ້ດັ່ງນັ້ນໃນການສະໜັບສະໜູນອາດຈະປັບແຕ່ງຈຳນວນລົດທຳອິດຕໍ່ຄ່າ PCU ກໍຈະໄດ້ປະລິມານການຈະລາຈອນທັງໝົດອອກມາໃນຮູບຂອງລົດຕັ້ງຖ້າໃນບໍລິເວນທີ່ບໍ່ໄດ້ຫາຄ່າ PCU ມາກອາດຈະໃຊ້ຄ່າ PCU ຕາມທີ່ The Ministry of Transport ຕາມຕາຕະລາງລຸ່ມນີ້:

ປະເພດຂອງລົດ	ຄ່າ PCU			
	ທາງໄດ້ເມືອງ	ທາງອອກເມືອງ	ວົງວຽນ	ທາງແຍກສັນຍານໄຟ
ລົດລົ່ມ	1.00	1.00	1.00	1.00
ລົດຈັກ	0.75	1.00	0.75	0.33
ລົດບັນທຸກຂະໜາດກາງລົດ ບັນທຸກຂະໜາດໃຫຍ່	2.00	3.00	2.00	1.75
ລົດປະຈຳທາງ	3.00	3.00	2.00	2.25
ລົດຖີບ	0.33	0.5	0.5	0.20

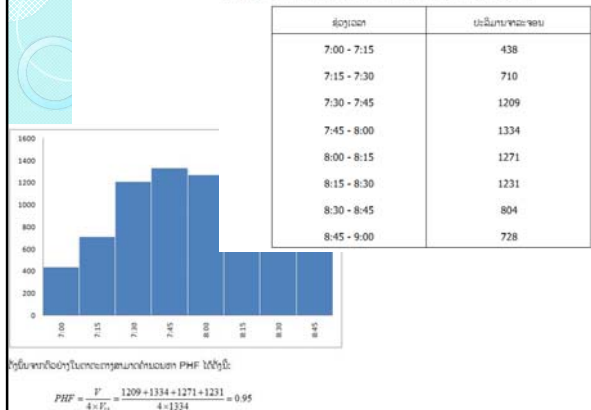
ຕົວຢ່າງການຈຳແນກປະເພດຂອງພາຫະນະ ແລະ ກຳນົດຄ່າຂອງ PCU ໃນໂຄງການ JICA PEC-VCSBF

Item	Vehicle classifications	From MPF	Application Factor in the Survey
1	Motor Cycle	0.33	0.33
2	Three Wheeled Vehicle (Tuk Tuk, Jumbo)	0.75	0.75
3	Sortex	1.0	1.00
4	Passenger Car/Taxi, Pick-up	1.0	1.00
5	Public Bus - Small (<29 passengers)	1.5	1.50
6	Public Bus - Big (>29 passengers)	2.0	2.00
7	Tour Bus - Small (<29 passengers)	1.5	1.50
8	Tour Bus - Big (>29 passengers)	2.0	2.00
9	Light Truck (2-Axle Truck)	1.5	1.50
10	Heavy Truck (>2-Axle Truck)	2.0	2.00
	Trailer	3.0	3.00

ຕາຕະລາງ 2.1 ສະແດງປະລິມານການຈະລາຈອນຕາຕະລາງເຊວ 0 ຫາ 7 ສະບັບ ປະລິມານການຈະລາຈອນສະເລ່ຍ ໃນໄລຍະເວລາ (Weekday) ໃນເທິງ

	1	2	3	4	5	6	7
ຈຳນວນລົດທີ່ຜ່ານ	ຈຳນວນລົດທີ່ຜ່ານ	ຈຳນວນລົດທີ່ຜ່ານ	ຈຳນວນລົດທີ່ຜ່ານ	ຈຳນວນລົດທີ່ຜ່ານ	ຈຳນວນລົດທີ່ຜ່ານ	ຈຳນວນລົດທີ່ຜ່ານ	ຈຳນວນລົດທີ່ຜ່ານ
1	22	31	425,000	209,000	9,493	12,710	
2	20	28	410,000	220,000	11,000	14,643	
3	22	31	189,000	189,000	8,400	11,419	
4	22	30	400,000	200,000	9,091	12,222	
5	31	31	480,000	215,000	10,228	14,936	
6	22	30	900,000	230,000	10,485	16,667	
7	23	31	580,000	260,000	11,304	16,710	
8	31	31	970,000	260,000	12,381	19,397	
9	22	30	400,000	208,000	9,318	14,322	
10	22	31	420,000	190,000	8,636	13,540	
11	21	30	415,000	200,000	9,524	13,822	
12	22	31	400,000	210,000	9,545	13,902	
ສູງສຸດ	260	365	5,445,000	2,581,000			
AVL1	14,917.86	16,111.11					
AVL2	0.82461	0.81111					

ຕາຕະລາງ 2. ການທົດແທນຄ່າປະລິມານການຈະລາຈອນສູງສຸດໃນຊ່ວງເວລາ



2.3. ການສຳຫຼວດປະລິມານການຈະລາຈອນ

ໂດຍທົ່ວໄປການສຳຫຼວດປະລິມານການຈະລາຈອນສາມາດປະຕິບັດ

ໄດ້ 3 ແນວທາງດ້ວຍກັນດັ່ງນີ້:

- ການນັບໂດຍໃຊ້ຜະນັກງານເກັບກຳຂໍ້ມູນ (Manual Counting Methods)
- ເຄື່ອງນັບແບບເຄື່ອນຍ້າຍໄດ້ (Portable Mechanical Counters)
- ເຄື່ອງນັບແບບເຄື່ອນຍ້າຍໄດ້ (Portable Mechanical Counters)

ວິທີໃຊ້ຄົນນັບ



ເຄື່ອງນັບແບບເຄື່ອນຍ້າຍໄດ້

Counters)
ແບບຕິດຕັ້ງ
ຖານອນ

2.3.1 ການສຳຫຼວດປະລິມານການຈະລາຈອນໂດຍໃຊ້ຄົນນັບ

ອຸປະກອນຫຼັກທີ່ໃຊ້ໃນການສຳຫຼວດຂໍ້ມູນໄດ້ແກ່ແບບຟອມບັນທຶກຂໍ້ມູນຈຳນວນພາຫະນະແບບແຍກປະເພດແລະອາດໃຊ້ອຸປະກອນເສີມໄດ້ແກ່ເຄື່ອງນັບສະສົມ (Accumulating Hand Counters) ດັ່ງສະແດງໃນຮູບຂ້າງລຸ່ມນີ້:



2.3.2. ວັນ ແລະ ຊ່ວງເວລາທີ່ເຮັດການສຳຫຼວດຂໍ້ມູນ

ອີງຕາມຫຼັກການຂອງວິສະວະກຳຈະລາຈອນວັນ ແລະ ຊ່ວງເວລາໃນການນັບວັດແມ່ນຈະທຳການນັບໃນຊ່ວງວັນຄານຫາ ວັນພະຫຸດ (ເພາະເປັນມື້ທີ່ມີສະພາບການຈະລາຈອນບໍ່ກະຕືໃນເສັ້ນທາງທີ່ທຳການສຶກສາ) ສຳລັບຊ່ວງເວລາໃນການນັບວັດແມ່ນຂຶ້ນກັບຄວາມຕ້ອງການຂອງໂຄງການແຕ່ສ່ວນໃຫຍ່ແມ່ນຈະນັບໃນຊ່ວງ 15 ນາທີ.

ບໍ່ຄວນທຳການນັບວັດໃນວັນທີ່ມີສະພາບອາກາດມຸ້ງຕົວເຊັ່ນ: ຝົນຕົກ ເປັນຕົ້ນເພາະຈະເຮັດໃຫ້ຈຳນວນວັດທີ່ນຳໃຊ້ໃນເສັ້ນທາງດັ່ງກ່າວມີການປ່ຽນແປງ ແລະ ຖີ່ນຳໄປໃຊ້ໃນການຄາດຄະເນຄວາມຕ້ອງໃນການເດີນທາງອາດພາໃຫ້ເກີດມີຄວາມຄາດເຄື່ອນໄດ້.

ການຈັດການລະບົບການຈະລາຈອນ

3.1. ການວາງແຜນການຈັດການຈະລາຈອນບໍລິເວນທາງແຍກ

ການຈັດການຈະລາຈອນຢ່າງເໝາະສົມບໍລິເວນທາງແຍກນອກຈາກຈະ

ຊ່ວຍລຸດອຸປະຕິເຫດວົດຕ່າງກັນບໍລິເວນທາງແຍກໄດ້ແລ້ວ ຍັງຊ່ວຍແກ້

ບັນຫາການຈະລາຈອນຕິດຄັດໄດ້ອີກດ້ວຍ. ທັງນີ້ ເນື່ອງຈາກການ

ວາງແຜນການຈັດການຈະລາຈອນຈະຊ່ວຍໃຫ້ມີການແກ້ໄຂບັນຫາບໍ່

ບໍລິເວນທາງແຍກຢ່າງເປັນລະບົບ ແລະ ບໍ່ໃຫ້ເກີດບັນຫາຊ້ຳຊ້ອນ

3.2. ເປັນຫຍັງທາງແຍກຈຶ່ງອັນຕະລາຍ

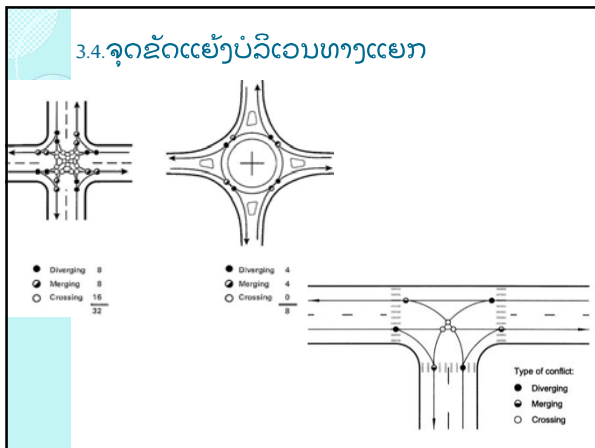
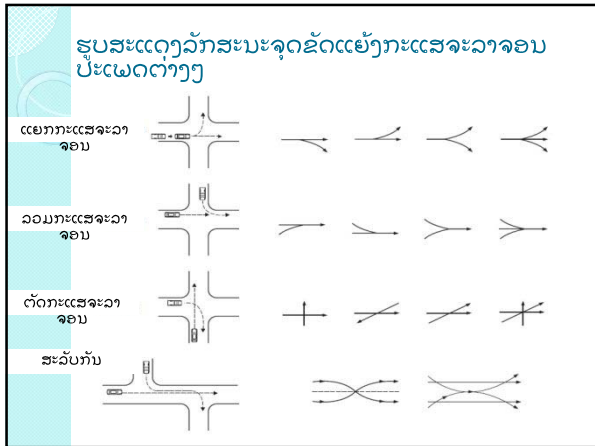
ເນື່ອງຈາກທາງແຍກເກີດຈາກການຕັດກັນຂອງເສັ້ນທາງຢ່າງ ໜ້ອຍສອງ

ເສັ້ນເຮັດໃຫ້ວັດສອງຄັນ ຫຼື ຫຼາຍກ່ວາເຄື່ອນທີ່ມາພົບກັນບໍລິ ເວນທາງ

ແຍກໃນລັກສະນະທີ່ກໍ່ໃຫ້ເກີດຄວາມຂັດແຍ້ງ ຊຶ່ງ ລັກສະນະການ

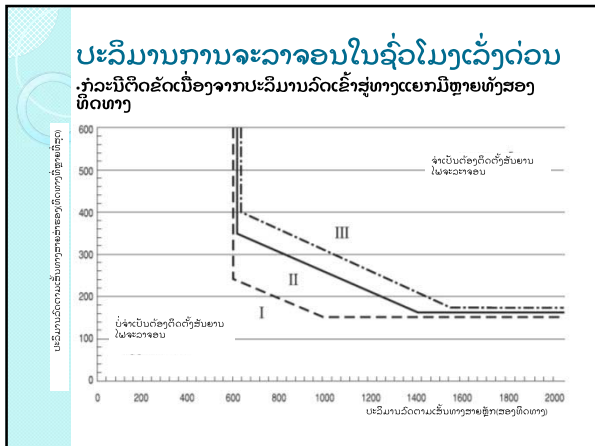
ພົບກັນຂອງວັດນີ້ສາມາດແບ່ງອອກໄດ້ເປັນ 4 ລັກສະນະດັ່ງນີ້:

- ການພົບກັນທີ່ກໍ່ໃຫ້ເກີດຈຸດຂັດແຍ້ງໃນລັກສະນະແຍກກະແສຈະລາຈອນ
- ການພົບກັນທີ່ກໍ່ໃຫ້ເກີດຈຸດຂັດແຍ້ງໃນລັກສະນະວອມກະແສຈະລາຈອນ
- ການພົບກັນທີ່ກໍ່ໃຫ້ເກີດຈຸດຂັດແຍ້ງໃນລັກສະນະຕັດກະແສຈະລາຈອນ
- ການພົບກັນທີ່ກໍ່ໃຫ້ເກີດຈຸດຂັດແຍ້ງໃນລັກສະນະສະລັບກັນ



3.5. ການພິຈາລະນາໃນການຕິດຕັ້ງສັນຍານໄຟຈະລາຈອນ

ການຕັດສິນໃຈຕິດຕັ້ງສັນຍານໄຟຈະລາຈອນຕ້ອງພິຈາລະນາເຖິງຄວາມຈຳເປັນປະກອບບໍ່ອາດດຳເນີນການຕິດຕັ້ງທຸກແຫ່ງໄດ້ເພາະການຕິດຕັ້ງສັນຍານໄຟຈະລາຈອນໃນບໍລິເວນທີ່ບໍ່ເໝາະສົມອາດກໍ່ໃຫ້ເກີດບັນຫາຈະລາຈອນຕາມມາເຊັ່ນ: ເຮັດໃຫ້ເກີດຄວາມວ່າຊ້າເພີ່ມຂຶ້ນແກ່ຄົນຂ້າມທາງ ແລະ ພາຫະນະທີ່ເຂົ້າມາສູ່ທາງແຍກ, ເຮັດໃຫ້ມີການຜູ້ຜັນສັນຍານໄຟຈະລາຈອນຮຸ້ນເຮັດໃຫ້ເກີດອຸບັດຕິເຫດ. ດັ່ງນັ້ນໃນການຕັດສິນໃຈຕິດຕັ້ງສັນຍານໄຟຈະລາຈອນຄວນຢູ່ໃນດຸນພິນິດຂອງວິສະວະກຳທີ່ຜູ້ຊ່ຽວຊານທີ່ຮັບຜິດຊອບແລະ ຄວນຄຳນຶງເຖິງເຫດອັນຄວນໃນການຕິດຕັ້ງສັນຍານໄຟດັ່ງຕໍ່ໄປນີ້:



ຕາຕະລາງຂໍ້ກຳນົດໃນການໃຊ້ເສັ້ນສະແດງ

ຈຳນວນຊ່ອງຈະລາຈອນ		ເສັ້ນສະແດງທີ່
ທາງສາຍຫຼັກ	ທາງສາຍສ້າງຮອງ	
1	1	I
1	2 ຫຼື ຫຼາຍກວ່າ	II
2 ຫຼື ຫຼາຍກວ່າ	1	II
2 ຫຼື ຫຼາຍກວ່າ	2 ຫຼື ຫຼາຍກວ່າ	III

ກຳລະນິຕິດຂັດເນື່ອງຈາກມີປະລິມານວັດໃນທາງສາຍຫຼັກທີ່ເຂົ້າສູ່ທາງແຍກຫຼາຍກວ່າເຮັດໃຫ້ທາງສາຍຮອງຕິດຂັດພິຈາລະນາໂດຍໃຊ້ເກນຂັດຕໍາຕັ້ງສະແດງໃນຕາຕະລາງດັ່ງນີ້:

ຂໍ້ມູນປະລິມານການຈະລາຈອນ	ປະລິມານຈະລາຈອນຂອງທາງສາຍຫຼັກ(ຮວມທັງສອງທິດທາງ)	ປະລິມານຈະລາຈອນຂອງທາງສາຍຮອງ(ທິດທາງທີ່ປະລິມານການຈະລາຈອນສູງສຸດ)
ປະລິມານຈະລາຈອນໃນຊົ່ວໂມງເລັ່ງດ່ວນ	900 ຫຼື ຫຼາຍກວ່າ	100 ຫຼື ຫຼາຍກວ່າ

ການອອກແບບລະບົບສັນຍານໄຟຈະລາຈອນ

ວິທີທີ່ໃຊ້ກັນໂດຍທົ່ວໄປມີຢູ່ 3 ວິທີ
ດ້ວຍກັນຄື: ວິທີ Basic principle, ວິທີ
ຂອງ Webster ແລະ ວິທີຂອງ Drew

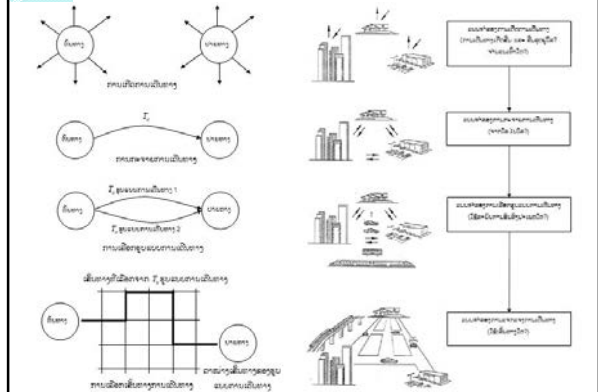


ຂັ້ນຕອນໃນການອອກສັນຍານໄຟຈະລາຈອນ

1. ສ້າງຫຼວດປະລິມານການຈະລາຈອນ
2. ຈັດ phase ແລະ stage ໃຫ້ເໝາະສົມ
3. ຄຳນວນຫາ Saturation Flow
4. ກຳນົດຄ່າ intergreen periods lost times ທີ່ເໝາະສົມ
5. ປຸງປະລິມານການຈະລາຈອນໃຫ້ຢູ່ໃນຮູບຄັນ/ຊົ່ວໂມງ (pcu/hr)
6. ຄຳນວນຄ່າ y ທີ່ຫຼາຍທີ່ສຸດຂອງແຕ່ລະ stage
7. ຄຳນວນຄ່າ Minimum Cycle Time
8. ຄຳນວນຄ່າ Optimum Cycle Time
9. ຄຳນວນໄລຍະເວລາສັນຍານໄຟຂຽວປະສິດທິຜົນ (Effective green time) ຂອງແຕ່ລະ stage
10. ຄຳນວນໄລຍະເວລາໄຟຂຽວທີ່ແທ້ຈິງ (Actual green time) ຂອງແຕ່ລະ stage
11. ຄຳນວນຄວາມຜ່າຊ້າທີ່ເກີດຂຶ້ນ ໃນແຕ່ລະທິດທາງຂອງທາງ
ແຍກສັນຍານໄຟ

ການວາງແຜນການຂົນສົ່ງ

ແບບຈຳລອງຕໍ່ເນື່ອງ 4 ຂັ້ນຕອນ (4 Step Model)



ຂໍຂອບໃຈ

Registration Form

Meeting Topic: Training for Using JICA STRADA 3.5

Place: Meeting room, Department of Road-Bridge and Transportation Engineering, Faculty of Engineering, NOUL

Date: 14th May 2014

Time:

ល/ດ No.	ឈ្មោះ Name & Surname	តំណែង Position	ស្ថាប័ន Organization	លេខទូរស័ព្ទ Telephone	អាសយដ្ឋានអ៊ីម៉ែល Email Address	ហត្ថលេខា Signature
1	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	និស្សិត	វិស័យ ឧស្សាហកម្ម	23022400	PTP1499@gmail.com	
2	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ			55619525	Baengchiam@hotmail.com	
3	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស	ក្រសួងប្រៃសណីយ៍	55620044	chanthavangroo@yahoo.com	
4	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស		55614535	Vongrackem@yahoo.com	
5	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស	LTEC	55682994	YDmmar.La.th@vnet.com	
6	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស	ស្ថាប័នបច្ចេកទេស	55678122	Thaungsy@yahoo.com	
7	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស		56149994		
8	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស		99935347	Maisouk.Pmn@gmail.com	
9	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស		99366603		
10	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស		77728998	Roi-coo@hotmail.com	
11	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស		99323322	deth5566@yahoo	
12	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស		96008555		
13	ឈ. វិសិដ្ឋ ឈ. វិសិដ្ឋ	បច្ចេកទេស		96412000		
14						
15						
16						
17						
18						
19						
20						

Traffic Survey Result at Intersections

Present Condition of Traffic Signal Operation

Control by Policeman

Signal Operation But during Peak hour time Control by Policeman

Present of Traffic Flow

Peak 1 hour Traffic Volume (7:30-8:30 AM)

Direction	Vehicle Class											Total	PCU
	Motor Cycle	Tuk Tuk, Jumbo	Sortiro	Car/Taxi, Pick-up	Bus Small	Bus Big	Tour Bus Small	Tour Bus Big	Light Truck (2-Axle Truck)	Heavy Truck & Trailer			
1	1,374	26	14	988	1	15	2	10	78	15	2,523	1,676	
2	355	9	1	162	0	0	0	0	1	0	529	289	
3	256	5	0	377	0	0	0	0	9	0	648	446	
4	396	9	0	300	0	0	0	0	16	1	722	463	
5	50	3	0	45	0	0	0	0	0	0	108	64	
6	1,982	22	12	1,008	1	2	1	0	24	2	3,054	1,738	
7	2,849	22	9	888	36	0	0	1	100	6	3,911	2,072	
8	474	26	0	320	0	0	0	0	19	0	839	524	
9	67	0	0	51	0	0	0	0	1	0	119	75	
10	132	4	0	91	0	0	0	0	0	0	227	138	
11	2,741	18	53	1,867	1	15	0	18	304	37	5,054	3,436	
12	696	6	8	382	0	0	0	0	5	2	1,099	636	
13	674	6	0	334	0	0	0	0	14	0	1,028	634	
14	240	3	0	111	0	0	0	0	4	1	359	200	
15	199	2	0	113	0	0	1	0	3	2	320	190	
16	1,116	7	0	688	3	0	0	0	6	0	1,820	1,075	

Present of Traffic Signal

Present Signal Phasing

G = Green Y = Yellow R = Red

Signal/Phase	1φ		2φ		3φ		Total
A	G	Y		R		R	
B		R	G	Y		R	
C		R		R	G	Y	
Time (Seconds)	35	2	25	2	35	2	101

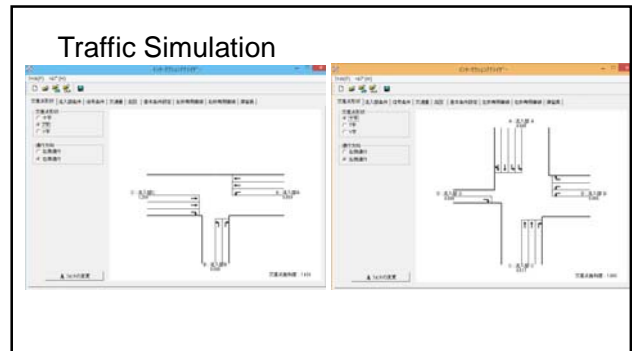
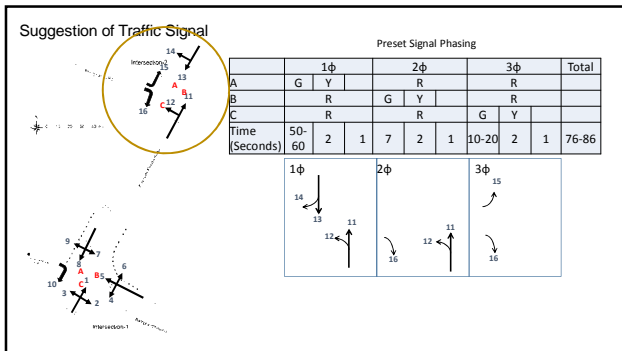
Suggestion of Traffic Flow

- No left Turn
- Traffic volume very small
- Without conflict from outbound traffic
- 2-lanes for left Turn
- Low traffic, very small
- Signal timing can be small

Suggestion of Traffic Signal

Present Signal Phasing

Signal/Phase	1φ		2φ		3φ		Total
A	G	Y		R		R	
B		R	G	Y		R	
C		R		R	G	Y	
Time (Seconds)	35	2	1	45	2	1	99



Intersection Analysis Result

Traffic congestion can be mitigation by optimization of traffic signal control.

But traffic congestion is not completely resolution only signal control.

Because traffic volume exceed road capacity substantially.

Conclusion

It needs mixed solution for traffic congestion.

- Traffic Management ?
- Road Network (make new Roads) ?
- Car and Motorcycle user change to Public Bus

Photos



VCSBE

Concept of Parts and Maintenance IT introduction

(IT introduction: To improve paper records in handwriting to records on the PC)

Prepared by Mr.Ishizeki (IT expert) Feb.5th 2013

1. Purpose

To simplify the parts and maintenance management and to gather the data for analyzing parts cost and bus maintenance cost from economical perspective.

2. Actual Condition of Parts and Maintenance Record

2-1 Parts Records (to be made by Parts Division)

2.1.1 Parts Inventory Record: This record is made on each part in handwriting.

Data: Date (end of month), Unit Price, Consumption Quantity, Price, Stock Quantity (Balance), etc

2.1.2 Parts Consumption Record: This record is made on each bus model with PC (Excel).

Data: Date (every day), Parts Number and Name, Consumption Quantity, Price, Recipient, Bus Number, etc.

2.2 Maintenance Record (to be made by Technical Division)

2.2.1 Maintenance Record: This record is made on each bus in handwriting.

Data: Date, Travel Distance, Part Name, Consumption Quantity, Price, Mechanic Name, etc.

3. Flow of IT introduction

Refer the flow of IT introduction. It consists of following four steps.

3.1 Step 1

(1) Objective

Making the parts inventory record and maintenance record by excel file, from using the excel data of parts consumption record. (Combine the parts division's excel file and technical division's excel file.)

The first target bus model is ISUZU.

(2) Tasks to be conducted

Task 1-1: Nominate person(s) who will maintain the excel file.

Task 1-2: Nominate person(s) who will input the data to excel file.

Task 1-3: Confirm latest handwriting and excel file which is used in parts and technical division.

Task 1-4: Create Parts Management excel file for ISUZU.

(Data title should be English and Lao language)

Task 1-5: Create Operation flow.

Task 1-6: Create Procedure documentation.

Task 1-7: Training person(s) who will maintain the excel file.

Training person(s) who has basic PC knowledge about excel basic functionality.
(VLOOKUP, SUMIF and \$ sign will be trained.)

Task 1-8: Training person(s) who will input the data to excel file.

Task 1-9: Explain Operation flow and Procedure documentation.

(3) Issues to be discussed and considered

There are 2 PCs in parts division and technical division

Use 1 PC or copy the file every day?

(Recommendation is to use 1 PC to avoid human error.)

3.2 Step 2

(1) Objectives

Expanding the target bus models to HINO, HYUNDAI, etc.

(2) Tasks to be conducted

Task 2-1: Create Parts Management excel file for HINO/HYUNDAI based on ISUZU file.

(Preparing parts master and bus master)

(3) Issues to be discussed, considered

How about Nissan micro bus and international bus.?

It is better that step 2 will be conducted by enterprise itself.

(Education in advance is important)

3.3 Step 3

(1) Objectives

Analyze parts cost and maintenance cost from economical perspective.

(2) Tasks to be conducted

Task 3-1: Analyze parts cost.

(Which parts requires many times to exchange? Then why?)

Task 3-2: Analyze bus maintenance cost.

(Which bus requires many maintenance cost? Then why?)

3.4 Step 4

(1) Objective

At this step, we have experience of cost analysis. We probably want to analyze data from another perspective.

(2) Tasks to be considered

Task 4-1: Confirm if further analysis can be done with current excel file.

(To check if there are any missing data items.)

Task 4-2: If it requires further data items, excel file must be enhanced.

The Project to Enhance the Capacity of Vientiane Capital State Bus Enterprise

Excel training for bus company staff to analyze the operation data from the beginning.

at University Faculty of Engineering Feb.19th Tue. 9:00-11:00

Attendee list

No.	Name	Division	Signature (I've learned excel functions*)
1	Boun sonk	Technical	
2	Ratsamy	Parts	
3	Sengmany	General Affair	
4	Korlakay	Finance	
5	Nikom	Finance	
6	Somkit	Technical	
7	Tanongsy	Planning	
8	Kemphone	Technical	
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

*Learned function:

Calculation

Function : SUM, SUMIF,
VLOOKUP

Filter

\$ sign

Creating Graph

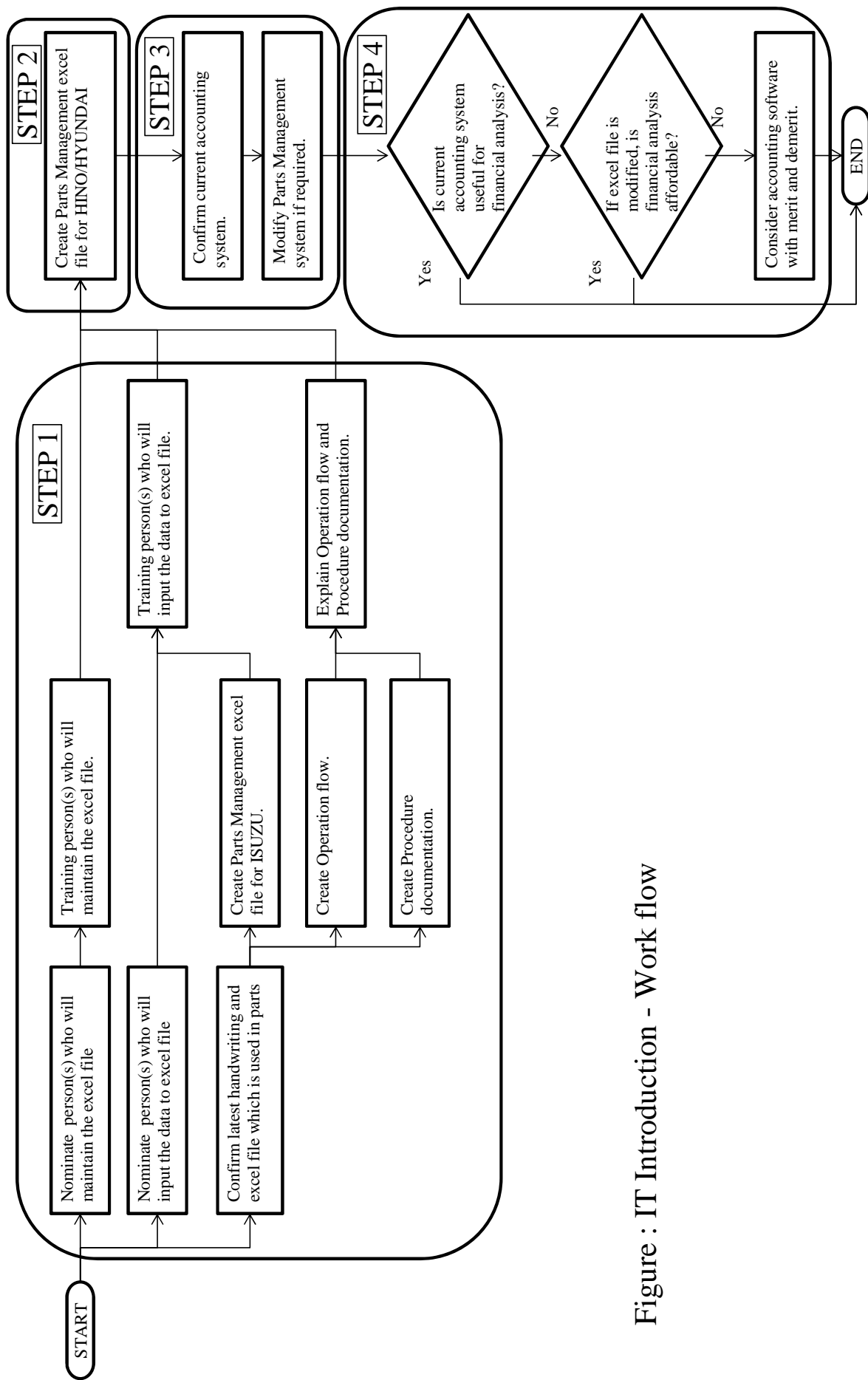


Figure : IT Introduction - Work flow

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Vientiane Capital
Department of Public Works and Transport
Vientiane Capital State Bus Enterprise

Date: 12

Month: February

Year: 2013

Item	Bus No:	Incoming Bus	Operation Route		Name & Surname		No of Trip		Refill Fuel Rate (Diesel)			Ticket Price	Remark
					Bus Driver	Ticket Caller	Plan	Actual	Define	Tank Remain	Actual		
1	159		Tha Lath	5	Symone								
2	160		Tha Ngone	5	Soukkhavong								
3	161		Phone Tong	3	Vanxay								
4	162				Toun								
5	163				Soukxay								
6	164		Thong Pong	1	Phouthong								
7	165		Dong Dok	1	Phounthep								
8	166		Tha Deua	1	Aroune								
9	167		Phone Tong	1	Vilay								
10	168		Nong Tha	3	Soulith								
11	169		Tha Ngone	2	Khammanh								
12	170		Dong Dok	2	Singkeo								
13	171		Tha Deua	7	Pern								
14	130		Nong Teng	2	Bounmy								
15	131		Tha Lath	1	Lathsamy								
16	132		Phone Tong	2	Chamlong								
17	133		Tha Deua	8	Khounpaseurt								
18	134		Tha Ngone	1	Khamfath								
19	135		Thong Pong	2	Sysouk								
20	136		Dong Dok	3	Khamfong								
21	137		Tha Deua	10	Phoxay								
22	138		Nong Tha	1	Khamdeang								
23	139		Tha Ngone	6	Chanthavy								
24	140		Tha Lath	2	Bounsou								
25	141		Tha Deua	9	Souvanny								
26	142		Phone Tong	6	Samleth								
27	143		Dong Dok	6	Savai								
28	144		Tha Deua	2	Sammany								
29	145		Tha Lath - VTE		Symone								
30	146		Tha Deua	6	Khamdeang								
31	147				Khamfoung								
32	148		Dong Dok	5	Khankeo								
33	149		Tha Ngone	3	Bounthan								
34	150		Tha Deua	3	Oudom								
35	151		Tha Lath	3	Bounleap								
36	152		Dong Dok	4	Sengdeuang								
37	153				Khamphone								
38	154		Tha Deua	4	Khom								
39	155		Phone Tong	4	Litthsack								
40	156		Tha Ngone	4	Somboun								
41	157		Tha Deua	5	Sackda								
42	158		Tha Lath	4	Compiter								

Photos















THE PROJECT TO ENHANCE THE CAPACITY OF VIENTIANE CAPITAL STATE BUS ENTERPRISE

Register


Topic: Daily Maintenance Training

Date : 23 May 2013

Location : VCSBE

ສ/ດ No.	ຊື່ ແລະ ນາມສະກຸນ Name & Surname	ມາຈາກພາກສ່ວນ Organization	ເບີໂທລະສັບມືຖື Telephone number	ທີ່ຢູ່ອີເມວ Email Address	ລາຍເຊັນ Signature
1	ທ່ານ ທ້າວ ທິວ ທິວ ທິວ	ຂະແໜງການ	05678122		
2	ທ່ານ ທ້າວ ວິໄລ ວິໄລ ວິໄລ	ບໍລິຫານ	02055676257		
3	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	020.55619495	-	
4	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	55512185		
5	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	56614405		
6	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	55528230		
7	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	55914356		
8	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	55603933		
9	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	55404650		
10	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	22997373		
11	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	22443715		
12	ທ່ານ ທ້າວ ວິໄລ ວິໄລ	ບໍລິຫານ	54784545		

ລ/ດ No.	ຊື່ ແລະ ນາມສະກຸນ Name & Surname	ຕຳແໜ່ງ Position	ມາຈາກພາກສ່ວນ Organization	ເບີໂທລະສັບມືຖື Telephone number	ທີ່ຢູ່ອີເມວ Email Address	ລາຍຊື່ນ Signature
13	ທ. ຄຳ ສິມ	ບໍລິຫານ	ຂົນສົ່ງ	55013370		
14	ທ. ນາງ ທຸມ. ວິວະ ວົງ ອິນທິພອນ ສິມ	ສຳນັກງານ ບໍລິຫານ	ອົງ ລາວ ມາ ຊາຍ ມາ	55693397		
15	ອິນທິພອນ ສິມ	ບໍລິຫານ		56523412		
16	ອິນທິພອນ ສິມ	ບໍລິຫານ		07566631		
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DAILY CHECK

The Project to Enhance the Capacity of Vientiane Capital State Bus Enterprise

2013-May-21

Sample of Check Sheet


DAILY CHECK LIST

Date: _____ Driver: _____ Check: _____
 Meter No: _____ Meter No: _____ Mile: _____
 Mileage: _____


Check Item	Pass	Result
1. Engine Oil Level		
2. Water Level		
3. Dust Indicator		
4. Horn and Light Condition		
5. Tire Condition		
6. Brake Condition		
7. Radiator Panel		
8. The Condition		
9. Electrical Condition		
10. Tire and Wheel Condition		

Checked: _____

Engine Oil Level



Engine Oil Level Stick




- ✓ Max Level
- ✓ Min Level

◆ If Oil is Low Level

□ You should be refill oil

Idemitsu CI-4 15W-40
Engine Oil

Water Level




If Water Low Level
Please Be Refill Water

Radiator Cap

- ✓ Max Level
- ✓ Min Level

Dust Indicator



Dust Indicator

If come out red line when should be check to Air cleaner

Horn and Light Condition



- ✓ Front
Head Light & Winker



- ✓ Rear
Stop, Winker and Back Lamp



- ✓ Drive Seat
Horn & Indicator

Drain Water from Air Tank



✓ **L side Luggage Space**
Please open door



✓ **Water Drain Knob**
After start engine when Pull this knob

Clutch Oil Level

Please keep oil level Between Min and Max


If Min Level

↓

You should be refill oil

↓


Kind of Oil
DOT-3 Brake Oil



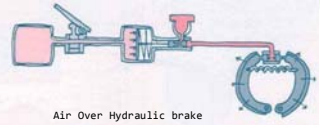
✓ Max Level

✓ Min Level

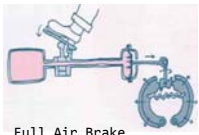
Brake Condition



Hydraulic Brake



Air Over Hydraulic brake

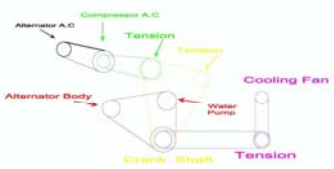


Full Air Brake

✓ Check brake pedal free Play and brake function

V-Belt Tension

✓ Please Check to Tension of Each V-Belt



Compressor A.C
Tension

Alternator A.C
Tension

Alternator Body

Cooling Fan


Water Pump

Crank Shaft
Tension

Please Check to All V-Belt Tight Condition

Steering Oil

Please keep oil level Between Min and Max



✓ Max Level

✓ Min Level

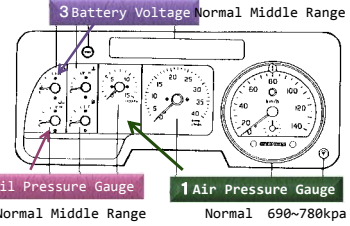
If Min Level

↓

You should be refill oil

Kind of Oil
ATF Oil

Indicator Panel



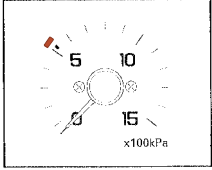
3 Battery Voltage Normal Middle Range

2 Oil Pressure Gauge Normal Middle Range

1 Air Pressure Gauge Normal 690-780kpa

Before Operation Bus, Please you check to condition for each Meter

Air Pressure Gage



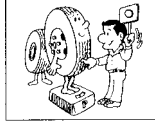
Normal Pressure

690~780kpa

When the pressure becomes lower than 520kpa the indicator light on the instrument panel operates simultaneously with the warning buzzer

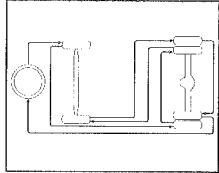
Tire

All Tires Should Be Check



✓ Check tires for inflation and Damage

✓ Normal Air Pressure
725kpa 7.25kg/cm2
9.00R-20-14PR





✓ Please be Tire rotation

Necessary for tire control to Relocate tire periodically as Show in Figure to make each tire Wear even.

Passenger Door Condition

How is Condition of Passenger Door

✓ Smoothly Operate ?

✓ Completely Shut ?

During Operation

□ Confirmation to Door Area

➤ No Parson, No Children ?

Oil and Water Leakage

Finally Go Around BUS






If You See Leakage Oil WATER

↓

Inform to Mechanic !

Digital Tachograph



Check to Memory Card for Digital Tachograph

If not yet insert Memory Card for Digital Tachograph

↓

Come Alarm Noise

The End

Thank You Very Much



05.19.2013

Safety Driving

DAILY CHECK LIST

Date y m d

Weather Fine Cloudy Rain

Driver Name _____

Service Meter h

Bus Line _____

Trip km

Bus No. _____

Time		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
	Operation																												t	m
	Maintenance																												t	m
	Other																												t	m

No.	Check Items	Check		Result	
		OK	NO		
1	Radiator Water Level				
2	Engine Oil Level				
3	Dust Indicator				
4	Horn and Light Condition				
5	Drain Water from Air Tank				
6	Clutch Oil Level				
7	Brake Condition				
8	V-Belt Condition				
9	Steering Oil Level				
10	Indicator Panel	Air Pressure			
		Engine Oil Pressure			
		Battery Voltage			
11	Tire Condition	Front L			
		Front R			
		Rear L			
		Rear R			
12	Passenger Door Condition				
13	Oil and Water Leakage				

Comment

.....

.....

.....

Checked by

අප්‍රේල් 14 වන දින, 2018 දී පැවැත්වූ විමර්ශන

නම: _____
 සේවා: _____
 ස්ථානය: _____
 විෂය: _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

N.	i, 01 3/4	i, 01 3/4		° öÄÖÖÖ
		OK	NO	
1	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
2	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
3	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
4	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
5	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
6	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
7	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
8	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
9	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
10	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			
11	1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26			

1/2 3/4 5/6 7/8 9/10 11/12 13/14 15/16 17/18 19/20 21/22 23/24 25/26



Training in the Meeting Room 1



Training in the Meeting Room 2



Check Engine Room



Check Luggage Room



Check Cooling Water



Check Engine Oil



Check Engine Belt by hand



Check Engine Belt by gauge

VCSBE

Training Program of Preventive Maintenance and Quality Control

1. Purpose

To introduce the method of preventive maintenance and quality control is helpful to preventing breakdown of buses. In the result, Maintenance time and cost will be minimized. And the operation rates will be raised.

- Preventive Maintenance: To maintain buses before a breakdown.

- Quality Control: To secure an accuracy of maintenance with measure and record of each maintained parts.

2. Target Parts

- 1) Engine Oil Pressure
- 2) Engine Revolution (Min, Max, AC on)
- 3) V-Belts Tension
- 4) Coolant Water Temperature
- 5) Air Conditioner Gas Pressure
- 6) Braking Line Pressure
- 7) Each Part Temperature (Oil Pan, Engine Block, Transmission, Differential Gear, Brake Drum)
- 8) Brake Lining Thickness
- 9) Tire Depth
- 10) Survey about foreign material in each Oil (Engine, Transmission, Differential Gear)

The each measurement data should be compare with specified value or previous value. If there are any differences on these values, the parts will be repaired.

Registration

Meeting Topic: 1st QC and Digital Tachograph Workshop


Place: VCSBE Meeting Room

Date: 15 May 2014

Time: 14:00 - 16:00

ລ/ດ No.	ຊື່ ແລະ ນາມສະກຸນ Name & Surname	ຕຳແໜ່ງ Position	ມາຈາກພາກສ່ວນ Organization	ເລກສະສະໜອງ Telephone number	ທີ່ຢູ່ອີເມວ Email Address	ລາຍເຊັນ Signature
1.	Boonpramee Thongmanee Poo Dica		VCSBE	55512185		
2	Boun souk. Sibounthanh / ສອກສອນ ສິບອຸນທານ		VCSBE	5566495	souk.sibounthanh@vcsbe.com	
3	Soutcharith. Phothitha - ສອກອຸທິ ສອກອິທິ			55676257		
4.	Thaongsy DETVONGSOME. chief of city bus		VCSBE	50678122.		
5	Khayphavanh Oudorside IT		VCSBE	94497131	monyboe2011@gmail.com	
6	SOMPITH KHANKED ສອກອິທິ			55588230		
7	Khamsane Vilasack Head Mechanical Division			55614406		
8.	Champbouy Sompaseth ສອກອິທິ			55616789		

Q C & Digital Tachograph Analyze



KIE Vientiane 20142014 May VCSBE

Before



Quality Control

After



What is Quality Control (QC)

Quality control (QC) is a procedure or set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria or meets the requirements of the client or customer.

In order to implement an effective QC program, an enterprise must first decide which specific standards the product or service must meet. Then the extent of QC actions must be determined (for example, the percentage of units to be tested from each lot). Next, real-world data must be collected (for example, the percentage of units that fail) and the results reported to management personnel. After this, corrective action must be decided upon and taken (for example, defective units must be repaired or rejected and poor service repeated at no charge until the customer is satisfied). If too many unit failures or instances of poor service occur, a plan must be devised to improve the production or service process and then that plan must be put into action. Finally, the QC process must be ongoing to ensure that remedial efforts, if required, have produced satisfactory results and to immediately detect recurrences or new instances of trouble.

What is Quality Control (QC)

Subject

→

QC Circle

Discussion

→

Purpose

- Improve Quality
 - Lower the Cost
 - Improve Safety
 - Lower Disposal Emission
- 7 tools
 - 1. Histogram
 - 2. Control Chart
 - 3. Pareto Chart
 - 4. Scatter Chart
 - 5. Check Sheet
 - 6. Fishbone Diagram
 - 7. Flow Chart
- *Standardization*
 - *Job Efficiency Contribution*
 - *Social Contribution*

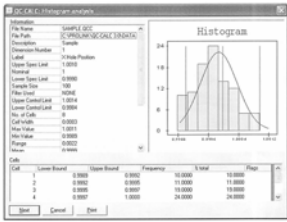
PDCA Cycle

↻

What is Quality Control (QC)

1. Histogram

QC-CALC can generate Histogram chart which provide an indication of the frequency of occurrence of sample values over a range of measurement. A histogram chart provides a bar style graph as shown. The pattern of the bars provides an indication of the distribution of the sample data. If the bars are arranged with the tallest at the approximate center and the shorter bars at the left and right extremities of the range, the distribution is most likely to be normal.



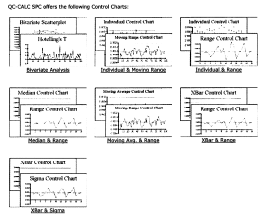
Stat	Lower Bound	Upper Bound	Counting	Total	Flag
1	0.0000	0.0000	10.0000	10.0000	
2	0.0000	0.0000	11.0000	11.0000	
3	0.0000	0.0000	18.0000	18.0000	
4	0.0000	1.0000	24.0000	24.0000	

What is Quality Control (QC)

2. Control Chart

Control Chart are a valuable process control tool since they provide a signal that a process has assignable cause variation which requires corrective action. A requirement for process control is the elimination of assignable cause variation. Control chart show whether a process is in statistical control or if assignable cause variation is present.

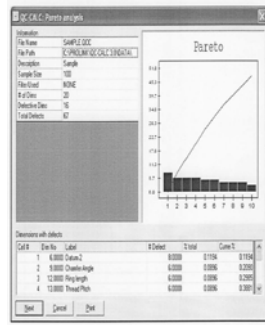
QC-CALC offers the following Control Charts:



What is Quality Control (QC)

3. Pareto Chart

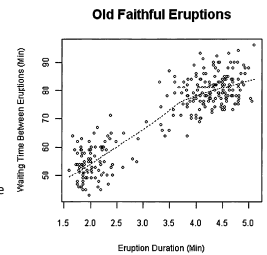
QC-CAL is equipped with Pareto analyzing charts which indicate the main sources of defective characteristics. A Pareto chart is a bar style graph of defective characteristics arranged in order of significance. The characteristic causing the greatest number of defects is displayed at the left-most position on the bar graph. The traditional concept behind Pareto charts is to highlight the "significant few" causes of defects from the "trivial many". Generally speaking, most quality control problems can be attributed to a relative few number of causes. Using a Pareto chart to sort defective characteristics in order of importance allows you to focus on the main cause of problems.



What is Quality Control (QC)

4. Scatter Chart

A scatter chart is a tool for analyzing relationship between two variables. One variable is plotted on the horizontal axis and the other is plotted on the vertical axis. The pattern of their intersecting point can graphically show relationship patterns. Most often a scatter chart is used to prove or disprove cause-and-effect relationships. While the chart shows relationships, it does not by itself prove that one variable causes the other. In addition to showing possible cause-and-effect relationship, a scatter chart can show that two variables are from a common cause-and-effect relationships, a scatter chart can show that two variables are from a common cause that is unknown or that one variable can be used as a surrogate for the other.



What is Quality Control (QC)

5. Check Sheet

The check sheet is a simple document that is used for collecting date in real time and the location where the date is generated. The document is typically a blank form that is designed for the quick, easy, and efficient recording of the desired information, which can be either quantitative or qualitative.

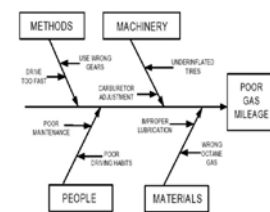
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Missing orders	12	20	15	18	10	25	18
Repacked orders	1	1	1	1	1	1	1
Late deliveries	15	1	10	1			
Shipping damages					15	15	15
Late payments	1						
Totals	11	8	27	6	2	28	19

When the information is quantitative, the check sheet is sometimes called a tally sheet. The check sheet is one of the seven basic tools of quality control made popular by Dr. Ishikawa. A defining characteristic of a check sheet that date is recorded by making marks ("Checks") on it. A typical check sheet is divided into regions, and marks made in different regions have different significance. Date is read by observing the location and number of marks on the sheet.

What is Quality Control (QC)

6. Cause-and-Effect (Fishbone Chart)

The Cause & Effect chart, also sometimes called the "Fishbone Chart", is a tool for discovering all the possible causes for a particular effect. The effect being examined is normally some product or service quality, such as a machined part not to specification, delivery times varying too widely, excessive number of bugs in software under development, and so on, but the effect may also relate to internal processes such as high rate of term failures.

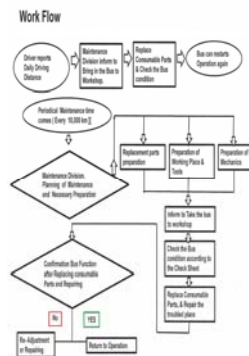


The major purpose of the Cause & Effect Chart is to act as a first step in problem solving by generating an immediate identification of major causes and point to the potential remedial actions or, failing this, it may indicate the best potential areas for further exploration and analysis. At a minimum, preparing a Cause & Effect chart will lead to greater understanding of the problem.

What is Quality Control (QC)

7. Flow Chart

A flowchart is a type of diagram that represents an algorithm, workflow or process, showing the steps as boxes of various kinds, and their order by connecting them with arrows. This diagrammatic representation illustrates a solution to a given problem. Flowcharts are used in analyzing, designing, documenting or managing a process or program in various fields.



What is Quality Control (QC)

PDCA Cycle

The plan-do-check-act cycle (Figure 1) is a four-step model for carrying out change. Just as a circle has no end, the PDCA cycle should be repeated again and again for continuous improvement.

Plan-Do-Check-Act Procedure

1. Plan. Recognize an opportunity and plan a change.
2. Do. Test the change. Carry out a small-scale study.
3. Check. Review the test, analyze the results and identify what you've learned.
4. Act. Take action based on what you work, learned in the study step: If the change did not go through the cycle again with a different plan. If you were successful, incorporate what you learned from the test into wider changes. Use what you learned to plan new improvements, beginning the cycle again.

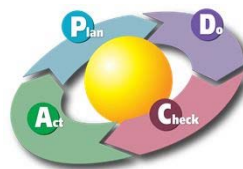


Figure 1

What is Quality Control (QC)

QC Circle

The small group of Workers of first line at work place improve the quality of Goods continuously • Service • Work

This small group

Do the operation by the one's motive, with the aid of thinking way of QC • Means of QC , proceed activity with the exert creativeness and aiming

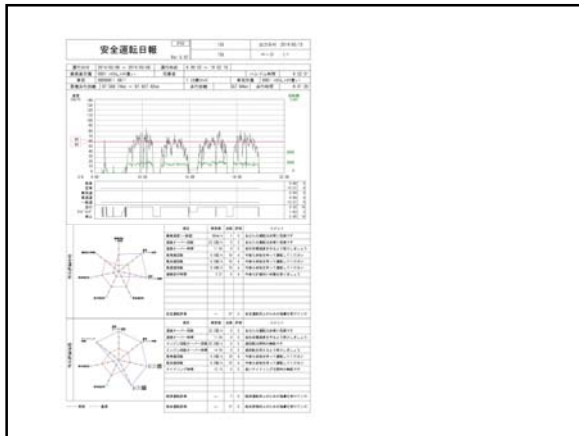
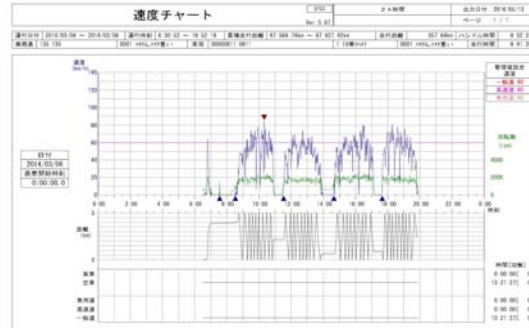
This activity

Aiming to make a work place, filling with bright and vitality and contribute customers' satisfaction and society and the improvement of QC circle member's ability , self – actualization.

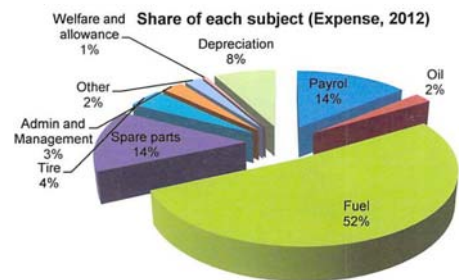
Business Manager and Administrator

Place human resource development • activation of work place to contribute constitutional improvement of company • development TQM(P Practice total company activity, such as TQM (Total Quality Management) and providing the support and leading to aiming to all workers joining by respecting humanity.

Digital Tachograph



Digital Tachograph



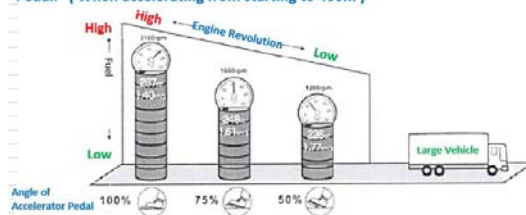
Fuel Saving Driving Techniques & Maintenance and Management

- Energy-efficient driving is a driving practice intended to improve fuel economy in automobiles.
- Fuel economy can be improved in many ways, including: increasing engine efficiency, reducing aerodynamic drag, rolling friction,
- This power points is consisted as followings,
 - ★ Driving Technique:
 1. Shift Up Earlier Stage
 2. Frequent Use High Shift Speed
 3. Driving Speed should be Modestly
 4. Making full use of Engine Brake
 5. Requisite Minimum Idling of Engine
 6. Vehicle Maintenance and Management for Fuel Saving
- ★ As far as vehicle Maintenance and Management, there are Tires, Engine Oil, Air Cleaner Elements which are related with Fuel Saving.
- Explain [Tire Air] in this material. 725kPa (7.25kg/cm²)

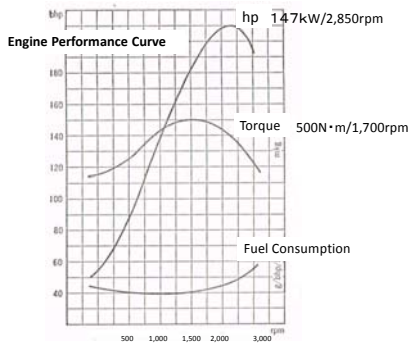
Driving Technique: 1. Shift Up Earlier Stage

Driving on the ordinary road, frequency of starting and acceleration will be increased. Because of traffic signal etc. this starting and acceleration will largely concerns with Fuel Consumption. To keep in mind to shift up within green zone of the engine revolution gauge by avoiding acceleration.

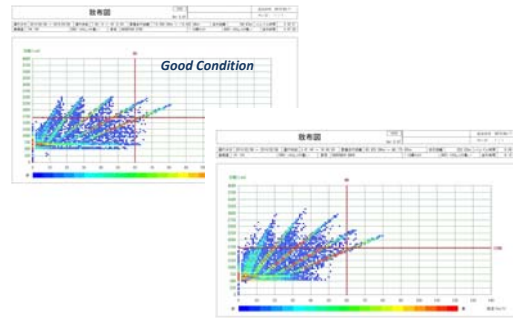
The difference of fuel consumption related to the Engine Revolution, and the Engine Revolution is going out from the stepping on angle of the Accelerator Pedal. (When accelerating from starting to 400m)



ISUZE 6HH1 ENGINE



Digital Tachograph



Driving Technique: 1. Shift up earlier stage [Actual Data]

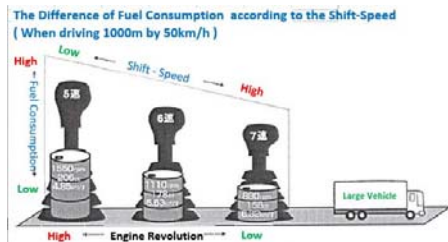
Large Vehicle	2100 rpm Shift 100% Stepping On	1600 rpm Shift 75% Stepping On	1200 rpm Shift 50% Stepping On
Fuel Consumption (cc)	287	248	225
Fuel Efficiency (km/ L)	1.40	1.61	1.77
Fuel Consumption difference (%)	Standard	16	27

Medium Vehicle	3300 rpm Shift 100% Stepping On	2350 rpm Shift 75% Stepping On	1400 rpm Shift 50% Stepping On
Fuel Consumption (cc)	145	120	116
Fuel Efficiency (km/ L)	2.76	3.08	3.46
Fuel Consumption difference (%)	Standard	11	25

Small Vehicle	3900 rpm Shift 100% Stepping On	2750 rpm Shift 75% Stepping On	1600 rpm Shift 50% Stepping On
Fuel Consumption (cc)	108	94	86
Fuel Efficiency (km/ L)	3.70	4.28	4.64
Fuel Consumption difference (%)	Standard	16	25

Driving Technique: 2. Frequent Use High Shift Speed

Driving on the ordinary road, using 4-shift speed in case of small car and 5-6 shift speed in case of large car as a actual shift speed. Because, for catching up car flow on the road easily, but, this increase fuel Consumption and there will be to collide with the another car from the behind. By shifting up 1(One) speed, engine will be decreased and can be expected lowering fuel consumption. Same speed will not be changed to the destination time. Let's keep in mind to use one more high shift speed.



Driving Technique: 2. Frequent Use High Shift Speed

Large Vehicle	5	6	7
Engine Revolution (rpm)	1550	1110	880
Fuel Consumption (cc)	206	178	158
Fuel Efficiency (km/ L)	4.85	5.83	6.32
Fuel Consumption difference (%)	Standard	16	30

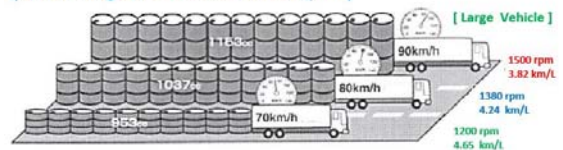
Medium Vehicle	4	5	6
Engine Revolution (rpm)	2400	1570	1100
Fuel Consumption (cc)	161	128	113
Fuel Efficiency (km/ L)	6.21	7.84	8.87
Fuel Consumption difference (%)	Standard	26	43

Small Vehicle	4	5	6
Engine Revolution (rpm)	2780	2180	1600
Fuel Consumption (cc)	149	110	94
Fuel Efficiency (km/ L)	6.72	9.07	10.62
Fuel Consumption difference (%)	Standard	35	59

Driving Technique: 3. Driving Speed should be Modestly

There is a close relationship between vehicle speed and time. Specially, bus will have a case to decide bus speed to get to the destination to carry Passengers within time. But, speed has a close relationship with fuel consumption. Speed is the cause of air resistance, air resistance is proportional to the square of the speed. Accordingly, when speed increases, air resistance will be dramatically increased. When thinking the time only, " Driving fast will be able to get the destination earlier " but when thinking the fuel consumption, possible to say, " Slow driving will be able to get the far distance " therefore, would like suggest you to drive economic speed, having the free time from the pressure to drive.

The Difference of Fuel Consumption according to the Driving Speed (When driving 4.4km at Maximum Shift- Speed)



Driving Technique: 3. Driving Speed should be Modestly

Large Vehicle				Medium Vehicle		
	90km/h	80km/h	70km/h	100km/h	90km/h	80km/h
Engine Revolution (rpm)	1500	1380	1200	2260	2000	1780
Fuel Consumption (cc)	1153	1037	953	854	771	701
Fuel Efficiency (km/L)	3.82	4.24	4.65	6.18	5.71	6.28
Fuel Consumption difference (%)	Standard	11	22	Standard	11	22

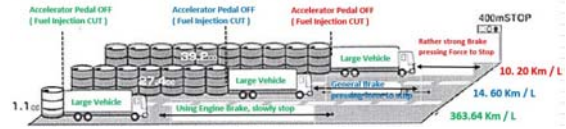
Small Vehicle			
	100km/h	90km/h	80km/h
Engine Revolution (rpm)	3100	2600	2500
Fuel Consumption (cc)	818	727	657
Fuel Efficiency (km/L)	5.38	6.05	6.68
Fuel Consumption difference (%)	Standard	13	25



Driving Technique: 4. Making full use of Engine Brake

It tends to be thought that better fuel consumption is depending on pressing accelerator pedal as the whole, but releasing accelerator pedal will change the fuel consumption largely. Ultimate fuel saving is driving without using fuel, needless to say, it is impossible of starting, acceleration and ordinal driving, but, possible when travelling down hill or shifting down driving. Because, when releasing foot from accelerator pedal, diesel engine is no fuel injection condition. It is useless to say, to release foot at early stage from the accelerator pedal at the long down hill and stopping the bus at the red signal or temporarily stop. You can contribute fuel saving largely by using engine brake.

The Difference of Fuel Consumption of Releasing Accelerator Pedal (When driving 4.4km at Maximum Shift-Speed)



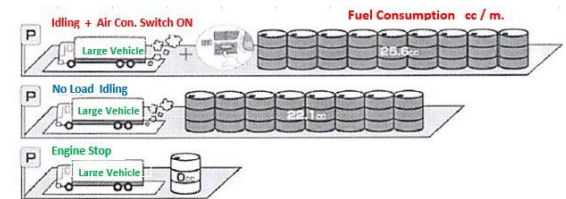
Driving Technique: 4. Making full use of Engine Brake

Large Vehicle			Medium Vehicle			
	Accelerator + Rather Strong Brake	Accelerator + General Brake Pressing Force	Engine Brake Effective Use	Accelerator + Rather Strong Brake	Accelerator + General Brake Pressing Force	Engine Brake Effective Use
Fuel Consumption (cc)	29.2	27.4	1.1	27.8	21.0	0.9
Fuel Efficiency (km/L)	10.20	14.60	363.64	10.79	14.29	333.33
Fuel Consumption difference (%)	Standard	40	2632	Standard	33	2980

Small Vehicle			
	Accelerator + Rather Strong Brake	Accelerator + General Brake Pressing Force	Engine Brake Effective Use
Fuel Consumption (cc)	24.1	18.1	0.8
Fuel Efficiency (km/L)	12.45	16.57	375.00
Fuel Consumption difference (%)	Standard	30	2913

Driving Technique: 5. Requisite Minimum Idling Driving

Recently, low idling driving stop movement is getting active by the regulation of local government of autonomous community or company instruction. But, It is not generalized to stop the engine when stopping or parking the vehicle because of many reasons. Avoiding the engine low idling, there will be great effect to reduce fuel consumption when thinking monthly or yearly. You are requested to stop the engine when you leave the vehicle. And make consideration that Air Conditioner will consume fuel considerably.



Driving Technique: 5. Requisite Minimum Idling Driving

Large Vehicle			Medium Vehicle			
	+ Air Con. Switch ON	No Load Idling	Engine Stop	+ Air Con. Switch ON	No Load Idling	Engine Stop
Fuel Consumption cc / Minute	25.6	22.1	0	14.3	11.5	0
Fuel Consumption L / Hour	1.54	1.33	0	0.86	0.69	0

Small Vehicle			
	+ Air Con. Switch ON	No Load Idling	Engine Stop
Fuel Consumption cc / Minute	12.2	9.7	0
Fuel Consumption L / Hour	0.73	0.58	0

Driving Technique: 5. Requisite Minimum Idling Driving



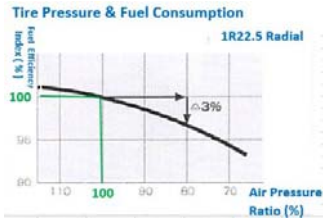
6. Vehicle Maintenance and Management for Fuel Saving

1. Tire

☆ As far as vehicle Maintenance and Management, there are Tires, Engine Oil, Air Cleaner Elements which are related with Fuel Saving.

☆ Tire Proper Pressure

When Tire pressure is 20% lower, Fuel Consumption will increase 3%.
On the other hand, when Tire pressure is higher, Fuel Consumption will be better, but, the life of Tire will be shortened.
So, it is important to keep proper Tire pressure.



Mr. Konosuke MATSUSHITA

The Founder PANASONIC

Don't repeat same things of yesterday, for today,
Even small things is acceptable,
Even small matter is acceptable,
Many people's these small THINK OUT 's accumulation will produce large prosperity.

The END

Thank you very much



The JICA project to enhance the capacity of Vientiane capital state bus enterprise
Workshop of QC and Digital tachograph

Date : 15th May 2014

Name : SEMETH

Position : Tekha

Organization : _____

Item		Rating Scale	
		Yes	No
1. QC			
1	Do you know the outline of the QC before this workshop?	✓	
2	Did you understand of QC ?	✓	
3	Do you know the 7 tools of the QC before this workshop?		✓
4	Did you understand of 7 tools for QC before this workshop?	✓	
5	Do you know the PDCA cycle before this workshop ?	✓	
6	Did you understand the PDCA cycle ?	✓	
2. Digital Tachograph			
1	Do you know the Digital Tachograph before this workshop ?	✓	
2	Did you understand the Digital Tachograph ?	✓	
3	How to analyze to the Digital Tachograph before this workshop?	✓	
4	Did you understand analyze to Digital Tachograph ?	✓	
5	How to drive to save the fuel before this workshop ?	✓	
6	Did you understand save the fuel driving?	✓	

The JICA project to enhance the capacity of Vientiane capital state bus enterprise
Workshop of QC and Digital tachograph

Date : 15th May 2014

Name : ບຸນ ຊຽງວຽງ

Position : ສຳນັກງານ

Organization : _____

Item		Rating Scale	
		Yes	No
1. QC			
1	Do you know the outline of the QC before this workshop?	✓	
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3	Do you know the 7 tools of the QC before this workshop?		✓
4	Did you understand of 7 tools for QC before this workshop?	✗	✓
5	Do you know the PDCA cycle before this workshop ?	✓	
6	Did you understand the PDCA cycle ?	✓	
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1	Do you know the Digital Tachograph before this workshop ?	✓	
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4	Did you understand analyze to Digital Tachograph ?	✓	
5	How to drive to save the fuel before this workshop ?	✓	
6	Did you understand save the fuel driving?	✓	

The JICA project to enhance the capacity of Vientiane capital state bus enterprise
Workshop of QC and Digital tachograph

Date : 15th May 2014

Name : Khamsene Vilasack

Position : Head Mechanical Division

Organization : _____

Item		Rating Scale	
		Yes	No
1. QC			
1	Do you know the outline of the QC before this workshop?	✓	
2	Did you understand of QC ?	✓	
3	Do you know the 7 tools of the QC before this workshop?	✓	
4	Did you understand of 7 tools for QC before this workshop?	✓	
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6	Did you understand the PDCA cycle ?	✓	
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4	Did you understand analyze to Digital Tachograph ?	✓	
5	How to drive to save the fuel before this workshop ?	✓	
6	Did you understand save the fuel driving?	✓	

The JICA project to enhance the capacity of Vientiane capital state bus enterprise
Workshop of QC and Digital tachograph

Date : 15th May 2014

Name : Champhay

Position : _____

Organization : _____

Item		Rating Scale	
		Yes	No
1. QC			
1	Do you know the outline of the QC before this workshop?	✓	
2	Did you understand of QC ?	✓	
3	Do you know the 7 tools of the QC before this workshop?	✓	
4	Did you understand of 7 tools for QC before this workshop?	✓	
5	Do you know the PDCA cycle before this workshop ?	✓	
6	Did you understand the PDCA cycle ?	✓	
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4	Did you understand analyze to Digital Tachograph ?	✓	
5	How to drive to save the fuel before this workshop ?	✓	
6	Did you understand save the fuel driving?	✓	

The JICA project to enhance the capacity of Vientiane capital state bus enterprise
Workshop of QC and Digital tachograph

Date : 15th May 2014
Name : Phoungphone
Position : Dep. Director
Organization : VCSBE

Item	Rating	Scale	
		Yes	No
1. QC			
1	Do you know the outline of the QC before this workshop?	✓	
2	Did you understand of QC ?	✓	
3	Do you know the 7 tools of the QC before this workshop?		✓
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5	How to drive to save the fuel before this workshop ?	✓	
6	Did you understand save the fuel driving?	✓	

The JICA project to enhance the capacity of Vientiane capital state bus enterprise
Workshop of QC and Digital tachograph

Date : 15th May 2014
Name : Mr. Phongsavanh Soudou Saka
Position : IT
Organization : VCSBE

Item	Rating	Scale	
		Yes	No
1. QC			
1	Do you know the outline of the QC before this workshop?		✓
2	Did you understand of QC ?	✓	
3	Do you know the 7 tools of the QC before this workshop?		✓
4	Did you understand of 7 tools for QC before this workshop?		✓
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6	Did you understand the PDCA cycle ?	✓	
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3	How to analyze to the Digital Tachograph before this workshop?	✓	
4	Did you understand analyze to Digital Tachograph ?	✓	✓
5	How to drive to save the fuel before this workshop ?	✓	✓
6	Did you understand save the fuel driving?	✓	

The JICA project to enhance the capacity of Vientiane capital state bus enterprise
Workshop of QC and Digital tachograph

Date : 15th May 2014
Name : Phanangsy DEIVONGSARE
Position : Chief of City BUS
Organization : VCSBE

Item	Rating	Scale	
		Yes	No
1. QC			
1	Do you know the outline of the QC before this workshop?		✓
2	Did you understand of QC ?		✓
3	Do you know the 7 tools of the QC before this workshop?		✓
4	Did you understand of 7 tools for QC before this workshop?	✓	
5	Do you know the PDCA cycle before this workshop ?	✓	
6	Did you understand the PDCA cycle ?	✓	
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3	How to analyze to the Digital Tachograph before this workshop?		✓
4	Did you understand analyze to Digital Tachograph ?	✓	
5	How to drive to save the fuel before this workshop ?	✓	
6	Did you understand save the fuel driving?	✓	

The JICA project to enhance the capacity of Vientiane capital state bus enterprise
Workshop of QC and Digital tachograph

Date : 15th May 2014
Name : Phongthong Soudou Saka
Position : IT
Organization : VCSBE

Item	Rating	Scale	
		Yes	No
1. QC			
1	Do you know the outline of the QC before this workshop?	✓	
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4	Did you understand analyze to Digital Tachograph ?	✓	
5	How to drive to save the fuel before this workshop ?	✓	
6	Did you understand save the fuel driving?	✓	

App4 Workshop Materials

Act 1-2-2 Improve Daily Bus Operation Based on the Operation Regulation

No.	Date	Seminar / Workshop	Page
(2)	Bus Driver Training		
1	22 May, 2014	Bus Driver's Training by Keisei Bus	App4-270
2	23 May, 2014	Seminar for Managers of Bus Drivers by Keisei Bus	App4-284

Meeting Records on VCSBE Bus Drivers' Training

Time/Date: Thursday, May 22, 2014, 19:00 – 21:00PM

Place: VCSBE Meeting Room

Speaker	Content	Action
Opening remark of the meeting: Mr. Yasuo Akiyama	<p>1. Mr. Yasuo Akiyama, Assistant Manager, Transport Management Division was opening remarks and warmly welcomed to all participants.</p> <p>2. Mr. Yasuo Akiyama presented about background of Keisei Bus Company and its operation of public transportation in Japan.</p>	
Video display and explanation of daily bus operation procedure of Keisei Bus: Mr. Yasuo Akiyama	Mr. Yasuo Akiyama explained about daily bus operation procedure with Video display.	
Discussion		
Bus driver	The bus driver questioned that: Is there any driver who stands by in case of the usual driver absent?	
Keisei Bus	The representative of Keisei Bus answered question above that: Yes, there are drivers who stand by in case of the usual driver absent. In this regard, Keisei Bus company prepares two or three drivers per day to stand by.	
Bus driver	Is there any punishment for the driver who always gets drunk?	
Keisei Bus	Yes, there is. Disciplinary rules upon alcohol test results are defined. In case above 0.25 mg/l, the driver is immediately hired. So far, nobody is dismissed due to alcohol test. Keisei Bus Company provide bonus to the drivers. The amount of the bonus is determined upon drivers' manner and attitude, drinking habitat is also considered.	
Bus driver	In case of the driver is not enough, is there any recruitment for new driver? - If yes, how about the salary of new driver and old driver?	
Keisei Bus	Yes, we have open recruitment for mid-career drivers and many people apply for. However, the regulation and the criteria for the selection are very difficult, so that many people fail to be selected for new driver. - For the salary payment is the same amount between new driver and old driver	
Bus driver	How about the old driver who will retire?	
Keisei Bus		

Speaker	Content	Action
	The driver at age 60 years old can get retirement and they are also able to continue bus driver as a contract employee until 65 years old. As a contract employee, the salary is decreased.	
Bus driver	Who wash and clean the bus?	
Keisei Bus	The driver is responsible to wash and clean the bus. Two drivers are assigned to one bus and they rotate driving shifts in the morning and the evening.	
Bus driver	Is there any solution of traffic congestions in Vientiane that affects bus operation?	
Keisei Bus	<p>In Japan, we also face the traffic congestions. However our first priority is safety. If driver is irritated not to be able to follow the timetable, it may cause accident. Therefore we say “safety first” and it reduces passengers accusing on bus operation as well.</p> <p>On the other hand, we have measures to mitigate bus operational delay caused by traffic congestions.</p> <ul style="list-style-type: none"> - If a driver gets stuck in a serious congestion, the driver calls to the company to send stand by bus to pick up passengers. - Daily peak hours are taken into consideration on timetables in Japan. The bus travel time is evaluated first and travel time between bus stops in peak hours are longer than other ordinary hours. 	
Alcohol test		
Explanation purpose of the seminar: Mr. Yasuo Akiyama	Mr. Yasuo Akiyama showed a manual for bus drivers and explained about being a good driver and good service for the passengers. (see attachment)	
Requests from Keisei Bus Mr. Tsutomu Aizawa	<p>The representative of Keisei bus company had 2 requests for the drivers as follows:</p> <ol style="list-style-type: none"> 1. Greeting and saying ‘Thank You’ to the passengers. 2. Stop the bus engine when there is no passenger in the bus. 	

The bus driver’s training was adjourned at 21:00.

List of Participants

Meeting Topic: VCSBE Bus Driver Training

Place: VCSBE Meeting Room

Date: 22 May 2014

Time: 19:00 - 21:00

ລ/ດ No.	ຊື່ ແລະ ນາມສະກຸນ Name & Surname	ຕຳແໜ່ງ Position	ເບີໂທລະສັບມືຖື Telephone number	ລາຍເຊັນ Signature
1	Mr. Bounpone Fongmany	Deputy Director of VCSBE	55512185	
2	Mr. Vanly	Deputy Director of VCSBE	55606390	
3	Mr. Buapha Phetvisai	Deputy Director of VCSBE	55514112	
4	Mr. Thanongsy	Chief of Transport sector	55675122	
5	Mr. Punya Vilatham	Chief of Provincial Transport sector	54002902	
6	Mr. Soudchalit	Mechanic	56676257	
7	Mr. Juang Phengkhammy	Driver	98999100	
8	Mr. Khamphone	Driver	55569622	
9	Mr. Ken	Driver	55809834	
10	Mr. Tui	Driver	55022545	
11	Mr. Bounlath	Driver	56496383	
12	Mr. Sengphet	Driver	28048886	
13	Mr. Phouvong	Driver	55799261	
14	Mr. Phaiboun	Driver	56028386	
15	Mr. Suliya	Driver	22407316	
16	Mr. Khampong	Driver	9896832	
17	Mr. Koksavan	Driver	22338967	
18	Mr. Douangsamone	Driver	56127122	
19	Mr. Sengduan	Driver	5565778	
20	Mr. Litthisak	Driver	55328386	
21	Mr. Hai	Driver	59050997	
22	Mr. Phouvan	Driver	58816905	
23	Mr. Anousak	Driver	55910411	
24	Mr. Bounsou	Driver	55679912	

List of Participants

Meeting Topic: VCSBE Bus Driver Training

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ລ/ດ No.	ຊື່ ແລະ ນາມສະກຸນ Name & Surname	ຕຳແໜ່ງ Position	ເບີໂທລະສັບມືຖື Telephone number	ລາຍເຊັນ Signature
25	Mr. Sunsai	Driver	99850520	

Bus Driver's Training Manual

Keisei Bus Co., Ltd.

1. Driver's Intention

1) Appreciate passengers

Public bus service is to carry passengers to destinations safely and securely. Whereby, it is important for drivers to recognize that public bus is a hospitality business to passengers.

A forwarding company receives fees by transporting goods by trucks, whereas, we, public bus company; receive fare from passengers directly as consideration for transporting them safely. In other words, passengers purchase transportation service from us. So that, please say "thank you" when a passenger rides on your bus and pays fare.

2) Professionalism

You, drivers shall dedicate to safety driving as a professional driver with strong will not to cause any accident keeping passengers away from any peril on their trip.

Public bus service is an absolutely necessary transportation in Vientiane Capital. You are contributing socially by providing the essential service of transporting passengers safely. Safety is the most important for passengers, so that, you should keep on safety driving and proud of it.

2. What is the Safety Driving?

1) Drivers' mind while driving

- Be prudent

Carefully observe traffic conditions you face and drive your bus adequately vis-à-vis. Always be ready for giving way to other cars, rather than cutting into lane.

- Be careful and suspicious

Drive carefully with evaluating your driving skill suspiciously. This attitude will avoid an accident.

- Be calm and steady

Whenever drive calmly and steadily, even when you late for scheduled departure times, drive safety first.

- Be gentle

Drive gently without anxiety.

2) Self control

- Keep well-regulated life style
- Care your health
- Be sober in the morning
- Free from drugs

3) Check vehicle before starting operation

Please note that if you cause an accident, it affects all your passengers and their relatives' lives. You are responsible on your passengers while they are on your bus. If you cause an accident, it may kill somebody and it is never recoverable.

3. Importance of customer service

- 1) Remember that your salary is paid from collected fare paid by passengers
- 2) Appreciate passengers and say "thank you" with smile to passengers
- 3) Talk politely to passengers, never be arrogant
- 4) Keep smiling and make eye contact
- 5) Keep yourself tidy, wearing uniform

Please note that some passengers are not familiar with public bus service and get nervous to be stranger in the town. You can ease them by your kind, polite and gentle attitude to them. Such your attitude may increase the number of passengers.

To transport passengers safely

< Duty of the bus driver >

Provide comfortable transportation to the passengers with safe, relief and relax.

< Responsibility of the bus driver >

Drive safely and properly in accordance with traffic condition, and serve to the passengers with good manners.

1. Actions of driving

Perception: To percept sensitively any strange traffic situation to avoid traffic accident in advance

Judgment: To judge and decide how to avoid any danger in drive

Control: To control bus properly to avoid any danger in accordance with judgment

1) Starting

Safety first: Observe left side, right side and under the vehicle of front car. Check passengers on board.

Secure safety before starting, it will avoid any accident at the starting.

Engage the clutch at low engine revolutions as shown in figure 1 and 2. Slowly press the accelerator, never floor it at once. Shift up early.

Lives of passengers are in drivers' hands. Thus, sudden acceleration, sudden braking, abrupt steering are shall be avoided, or passengers feel nervous and distrust bus services. This is the major difference between cargo services.

In addition, high engine revolutions at a low speed make passengers anxious. It is fuel consuming and expensive driving manner.

How to control the clutch?

- Foot the clutch pedal from position 1 to 2
- Slowly engage the clutch from position 2 to 3
- If you release the clutch quickly, it cause a knocking



Figure 1 Clutch Control for Comfortable Driving

How to control the accelerator pedal?

- Foot the accelerator pedal slowly from position 1 to 2, and then bus accelerates slowly.
- Raise the accelerator pedal slowly, with feeling the pedal pushing your foot.
- If you foot steeply, the bus starts suddenly.

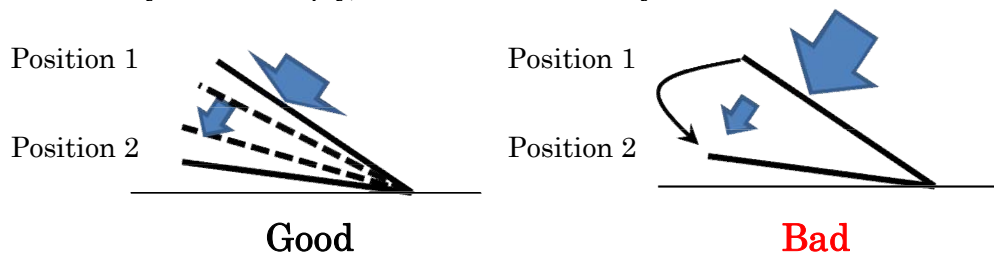


Figure 2 Accelerator Control for Comfortable Driving

2) Driving

Observe surroundings and traffic conditions; especially be careful on other vehicles, children, elderly people and bicycles.

You should always check traffic situations at front, rear, left side and right side and drive properly suit to the conditions.

When you drive, you should keep selecting higher gear to keep lower rev of engine, and keep in mind of early shift up and constant velocity. Over speed causes accidents.

Please note that traffic conditions are always changing even though you are familiar with the roads. Be careful, keep eyes on broaden sight, as a professional driver drive safer than yesterday.

To secure driving safely and prevent accident, all drivers of Keisei Bus conduct **point and call activity** when they start bus, turn right and turn left at intersection. The **point and call**

activity is to check by pointing and calling action they take.



[Black Spots]

Intersections are black spots of traffic accidents. When you turn at intersections, **beware and thoroughly decelerate before entering the intersections**. Vehicles are under the laws of physics as shown in figure 3.

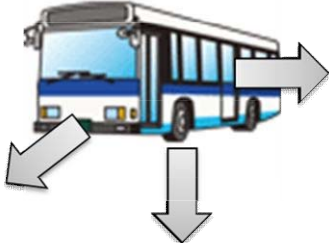
Inertial Force (to the front)	Centrifugal Force (to the left and right)
<ul style="list-style-type: none">- The more rapid acceleration/ deceleration cause the stronger force.- The higher speed causes the stronger force.- The heavier weight causes the stronger force.	<ul style="list-style-type: none">- The sharper curve causes the stronger force.- The higher speed causes the stronger force.- The heavier weight causes the stronger force.
Impulsive Force (to the front)	
<ul style="list-style-type: none">- The harder object exerts the stronger force.- The higher speed object exerts the stronger force.- The heavier weight object exerts the stronger force.	Gravitational Force (to the road)
	<ul style="list-style-type: none">- The heavier vehicle weight causes the stronger force.

Figure 3 Laws of Physics to the Bus Vehicle

3) Stopping

Sudden braking injures passengers on board by tumbling them and/ or hitting them to facilities in the cabin. Please remember **to drive gently as same as starting**.

Passengers do not expect sudden shock caused by sudden braking and hard braking. As the results, passengers hit each other and/ or facilities in the cabin and get injured. It may


sound weird but sudden braking in low speed is much more dangerous to passengers than that in high speed since passengers are unprepared sudden shock.

To decelerate gently, brake as shown in figure 4.

How to control the brake pedal?

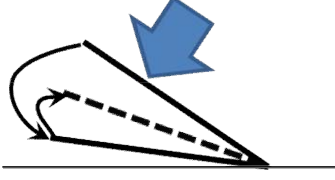
- Foot the brake pedal from position 1 to 2, and then raise foot to position 3. This action reduces shock of braking.
- If you keep position 2 or raise foot insufficiently after footing the brake pedal from 1 to 2, the bus stops suddenly and causes heavy shock.

Position 1
Position 3
Position 2



Good

Position 1
Position 3'
Position 2



Bad

The figure contains two diagrams illustrating foot placement on a brake pedal. The left diagram, labeled 'Good', shows a foot starting at Position 1 (top), moving to Position 2 (middle), and then to Position 3 (bottom). Blue arrows indicate the downward and then upward movement. The right diagram, labeled 'Bad', shows a foot starting at Position 1, moving to Position 2, and then staying at Position 2 instead of moving to Position 3. A blue arrow indicates the downward movement from Position 1 to Position 2, and a dashed line shows the foot's path.

Figure 4 Brake Control for Comfortable Driving

2. Conclusion

Let me emphasize that what the most important thing for the bus driver is to carry passengers safely and securely to the destinations. If you cause any accident, you shall be blamed as unaccountable for a professional bus driver. Your accident also tarnishes confidence in society of the bus service. It will reduce number of passengers which reduce turnover of the bus enterprise, as the result, it causes serious financial difficulties.

Let's drive safely, respect passengers and be friendly to them. Then, passengers and citizens will love your bus service and the company will be well-run.

Proud of you to be a bus driver, supporting citizens' transportation. Carry out your duties as a professional driver to keep driving safely.



Alcohol Check at Home



Roll call at Office



Receive ID Card to operate bus



Set ID Card on board



Check facilities on board



Mechanical check



Check outside facilities



Tire and loosening nuts check



Call for starting operation with operation manager



Departure



“Thank you very much for using Keisei Bus.”



Say thank you to passengers when they alight.



Driver does not touch any cash but automatic cash collection system handle cash.



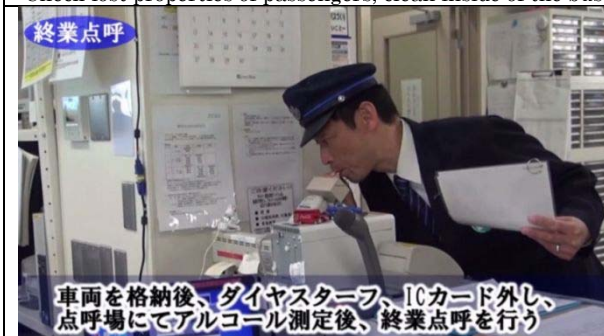
Driver feeds fuel by himself. Records of feeding are stored in an ICT Card.



Check lost properties of passengers, clean inside of the bus



Place Car locks



Check for finishing work including alcohol check



Call for finishing work with operation manager

From CBS Bus Departure Check List

	Time	Route No.	For	Bus No.	Name	Check
5	5H50	14	Friendship			
	5H50	23	Thangon			
6	6H00	30	Thonpong			
	6H00	24	NBS			
	6H05	14	Friendship			
	6H10	23	Thangon			
	6H10	31	Phongtong			
	6H20	14	Friendship			
	6H20	30	Thonpong			
	6H30	23	Thangon			
	6H30	29	Dongdok			
	6H30	31	Phongtong			
	6H30	24	NBS			
	6H35	14	Friendship			
	6H40	30	Thonpong			
	6H45	29	Dongdok			
	6H50	14	Friendship			
	6H50	23	Thangon			
6H50	31	Phongtong				
7	7H00	29	Dongdok			
	7H00	24	NBS			
	7H05	14	Friendship			
	7H10	23	Thangon			
	7H10	31	Phongtong			
	7H15	29	Dongdok			
	7H20	14	Friendship			
	7H30	23	Thangon			
	7H30	29	Dongdok			
	7H30	31	Phongtong			
	7H30	24	NBS			
	7H35	14	Friendship			
	7H45	29	Dongdok			
	7H50	14	Friendship			
	7H50	23	Thangon			
	7H50	31	Phongtong			
8	8H00	30	Thonpong			
	8H00	24	NBS			
	8H00	29	Dongdok			
	8H05	14	Friendship			
	8H10	31	Phongtong			
	8H15	23	Thangon			
	8H20	14	Friendship			
	8H20	29	Dongdok			
	8H30	31	Phongtong			
	8H30	30	Thonpong			
	8H30	24	NBS			
	8H35	14	Friendship			
	8H40	23	Thangon			
	8H40	29	Dongdok			
	8H50	14	Friendship			
	8H50	31	Phongtong			
9	9H00	23	Thangon			
	9H00	29	Dongdok			
	9H00	30	Thonpong			
	9H00	24	NBS			
	9H05	14	Friendship			
	9H10	31	Phongtong			
	9H20	14	Friendship			
	9H20	23	Thangon			
	9H20	29	Dongdok			
	9H30	31	Phongtong			
	9H30	24	NBS			
	9H35	14	Friendship			
	9H40	23	Thangon			
	9H40	29	Dongdok			
	9H50	14	Friendship			
	9H50	31	Phongtong			
10	10H00	23	Thangon			
	10H00	29	Dongdok			
	10H00	24	NBS			
	10H05	14	Friendship			
	10H10	31	Phongtong			
	10H20	14	Friendship			
	10H20	23	Thangon			
	10H20	29	Dongdok			
	10H20	30	Thonpong			
	10H30	31	Phongtong			
	10H30	24	NBS			
	10H35	14	Friendship			
	10H40	23	Thangon			
	10H40	29	Dongdok			
	10H50	14	Friendship			
	10H50	31	Phongtong			
10H50	30	Thonpong				
11	11H00	23	Thangon			
	11H00	29	Dongdok			
	11H00	24	NBS			
	11H05	14	Friendship			
	11H10	31	Phongtong			
	11H20	14	Friendship			
	11H20	23	Thangon			
	11H20	29	Dongdok			
	11H20	30	Thonpong			
	11H30	31	Phongtong			
	11H30	24	NBS			
	11H35	14	Friendship			
	11H40	23	Thangon			
	11H40	29	Dongdok			
	11H50	14	Friendship			
	11H50	31	Phongtong			

	Time	Route No.	For	Bus No.	Name	Check
12	12H00	23	Thangon			
	12H00	29	Dongdok			
	12H00	24	NBS			
	12H05	14	Friendship			
	12H10	31	Phongtong			
	12H20	14	Friendship			
	12H20	23	Thangon			
	12H20	29	Dongdok			
	12H30	31	Phongtong			
	12H30	30	Thonpong			
	12H30	24	NBS			
	12H35	14	Friendship			
	12H40	23	Thangon			
	12H40	29	Dongdok			
	12H50	14	Friendship			
	12H50	31	Phongtong			
12H50	30	Thonpong				
13	13H00	23	Thangon			
	13H00	29	Dongdok			
	13H00	24	NBS			
	13H05	14	Friendship			
	13H10	31	Phongtong			
	13H20	14	Friendship			
	13H20	23	Thangon			
	13H20	29	Dongdok			
	13H30	31	Phongtong			
	13H30	30	Thonpong			
	13H30	24	NBS			
	13H35	14	Friendship			
	13H40	23	Thangon			
	13H40	29	Dongdok			
	13H50	14	Friendship			
	13H50	31	Phongtong			
14	14H00	23	Thangon			
	14H00	29	Dongdok			
	14H00	24	NBS			
	14H05	14	Friendship			
	14H10	31	Phongtong			
	14H20	14	Friendship			
	14H20	23	Thangon			
	14H20	29	Dongdok			
	14H30	31	Phongtong			
	14H30	30	Thonpong			
	14H30	24	NBS			
	14H35	14	Friendship			
	14H40	23	Thangon			
	14H40	29	Dongdok			
	14H50	14	Friendship			
	14H50	31	Phongtong			
15	15H00	23	Thangon			
	15H00	29	Dongdok			
	15H00	30	Thonpong			
	15H00	24	NBS			
	15H05	14	Friendship			
	15H10	31	Phongtong			
	15H20	14	Friendship			
	15H20	23	Thangon			
	15H20	29	Dongdok			
	15H30	31	Phongtong			
	15H30	30	Thonpong			
	15H30	24	NBS			
	15H35	14	Friendship			
	15H40	23	Thangon			
	15H40	29	Dongdok			
	15H50	14	Friendship			
15H50	31	Phongtong				
16	16H00	23	Thangon			
	16H00	29	Dongdok			
	16H00	24	NBS			
	16H05	14	Friendship			
	16H10	31	Phongtong			
	16H20	14	Friendship			
	16H20	23	Thangon			
	16H20	29	Dongdok			
	16H30	31	Phongtong			
	16H30	30	Thonpong			
	16H30	24	NBS			
	16H35	14	Friendship			
	16H40	23	Thangon			
	16H40	29	Dongdok			
	16H50	14	Friendship			
	16H50	31	Phongtong			
16H50	30	Thonpong				
17	17H00	23	Thangon			
	17H00	29	Dongdok			
	17H00	24	NBS			
	17H05	14	Friendship			
	17H10	31	Phongtong			
	17H20	14	Friendship			
	17H20	29	Dongdok			
	17H30	23	Thangon			
	17H30	31	Phongtong			
	17H30	30	Thonpong			
	17H30	24	NBS			
	17H35	14	Friendship			
	17H40	29	Dongdok			
	18H00	14	Friendship			
	18H00	29	Dongdok			

Route No.	For	Cars	Trip
14	Friendship	10	49
23	Thangon	7	35
29	Dongdok	6	37
31	Phongtong	6	35
24	NBS	4	24
30	Thonpong	3	18
		36	198

100
Note

- How to fill in the check list.
 - ① Departed at designated time: ✓
 - ② Departed earlier or later than designated time: Fill in actual departure time
 - ③ Absent operation: -
- Heavy lined box shows same time departure of 23Thangon and 29Dongdok
It is better to separate departure time, since their routes duplicate from CBS to SBS.
The duplicated section from CBS to SBS shall be same price (3,000Kip).

Photos



Meeting Records on Manager Bus Operation Seminar

Time/Date: Friday, May 23, 2014, 09:00 – 11:00AM

Place: VCSBE Meeting Room

Speaker	Content
Mr. Aizawa Tsutomu	<p>1. Mr. Aizawa Tsutomu made opening remarks and warmly welcomed to all participants.</p> <p>2. Mr. Aizawa Tsutomu expressed his happiness to see changing of VCSBE in 6 months. For instance, time table at Friendship Bridge was newly installed, number of bus operation on Dongdok route (No.29) was increased and NBS route was operated by Isuzu buses.</p> <p>3. Mr. Aizawa Tsutomu presented a concept of time tables installing at terminals and the bus stops on the routes (see attachment). Furthermore, Mr. Aizawa recommended VCSBE to set time tables firstly at bus stops along the route from Dongdok to CBS, in order to increase the number of passengers.</p> <p>4. Mr. Aizawa Tsutomu presented a sample of diagram for Dongdok route (No.29). The diagram shall be used for increasing the punctuality of bus operation (see attachment)</p> <p>5. Mr. Aizawa Tsutomu showed the sample of bus driver salary of Keisei Bus Company (see attachment)</p>
Discussion	
Mr. Buapha Phetvisay	Mr. Buapha Phetvisay reported that the bus stop facility installation is under preparation by Blue Grass Company, an advertisement company which has the concession contract with Vientiane Capital for bus stop facility installation and maintenance.
Mr. Aizawa Tsutomu	Mr. Aizawa Tsutomu proposed VCSBE to request Blue Grass to set bus stops near the entrance of passages to facilitate passengers to use buses.
Mr. Aizawa Tsutomu	Mr. Aizawa Tsutomu showed a sample of bus driver working schedule and rest time table of Keisei bus. Keisei bus company assigns two drivers to one bus and drivers work the shift, for instance one driver works in the morning and another works in the evening in one day. Normally, A Keisei Bus driver works 8 hours a day.
Mr. Buapha Phetvisay	<p>Mr. Buapha Phetvisay corresponded that VCSBE also used such kind of working system, in previous time. However it was not efficient in VCSBE, therefore, VCSBE canceled it.</p> <p>Currently, VCSBE contracts with bus drivers on lump sum system. Due to the system, drivers tended to catch passengers anywhere on the road because drivers had to submit certain amount to VCSBE. If contracts with drivers were changed to salary system, it was assumed to be better management on drivers.</p>
Mr. Aizawa Tsutomu	Mr. Aizawa Tsutomu explained a check list he prepared which had all bus departure times from CBS. He recommended checking actual departure time by using the check list from time to time. He also noted that Dongdok route (No.29) and Thangon route (No.23) were set as same time departure, in spite of both routes pass SBS. He recommended setting time intervals between departure times of two routes, in addition,

Speaker	Content
	set same fare between CBS and SBS. By those improvements, passengers between CBS and SBS would become more convenient.
Mr. Buapha Phetvisay	Mr. Buapha Phetvisay explained that fare rate of from SBS to CBS of Thangon route (No.23) was same as Dongdok route (No.29), however, from CBS to SBS was different price. He said he would consider Mr. Aizawa's recommendations.
Mr. Aizawa Tsutomu	Mr. Aizawa Tsutomu asked which routes were profitable among urban bus routes.
Mr. Buapha Phetvisay	Mr. Buapha Phetvisay answered that profitable route was only Friendship Bridge Route (No.14). A bus fare calculation of Dongdok route upon distance was 4,500 kip, however the government allowed only 3,000 kip for the route due to students' convenience. Thangon Route (No.23) was also discounted route. Fare calculation of Thangon was 6,000 kip, however to compete sonteos the fare was set as 5,000 kip.
Mr. Aizawa Tsutomu	Mr. Aizawa Tsutomu proposed VCSBE to pick up passengers at the bus stops for the punctuality of bus operation and trustworthy from the bus user.
Mr. Buapha Phetvisay	Mr. Buapha Phetvisay noted that another issue disturbing punctuality was carrying luggage by passengers. Loading and unloading luggage took time and caused delay.
Mr. Bounpone Fongmany	Kanekeo NAOVALATH explained the features of urban bus service in Vientiane. Number of passengers in the weekend was larger than that of the weekday. Because people who had cars or motor cycles would not use bus for commuter. People from countryside lives in dormitories near universities or factories. Those people use bus in the weekend.

Registration

Meeting Topic: Manager Bus Operation Seminar

Place: VCSBE Meeting Room

Date: 23 May 2014

Time: 09:00 - 11:00

ລ/ດ No.	ຊື່ ແລະ ນາມສະກຸນ Name & Surname	ຕຳແໜ່ງ Position	ມາຈາກພາກສ່ວນ Organization
1	Mr. Bounpon Fongmany	Deputy Director	VCSBE
2	Mr. Buapa Phetvisay	Deputy Director	VCSBE
3	Mr. Vanly Chanchalern	Deputy Director	VCSBE
4	Mr. Aizawa Tsutomu	General Manager, Sales Division	Keisei Bus
5	Mr. Akiyama Yasuo	Manager, General Affairs Division	Keisei Bus
6	Mr. Yoshiro Kunimasa		KEI
7	Mr. Chanthala VORRASING		KEI

Recommendations on No.29 CBS ~ Dongdok:

1. Installation of Timetables at Bus Stops
2. On-time Operation at Bus Stops

- 1) Install timetables at present facilitated bus stops.
Start installation from inbound bus stops.
- 2) Name each bus stop on the route by place name or landmark.
Ex) AAA elementary school, BB bridge, CC intersection
- 3) Install timetables at Dongdok, the timetables shall have all departure time and all buses should comply not to depart earlier than designated times. At the CBS, timetables have been installed, therefore all buses should comply the timetables.
- 4) Clocks in the buses should keep in time.
- 5) Timetables at bus stops on the route shall have time of first bus, last bus and headways or frequency for operating hours.
Ex) *:00~*:00 Every 15 minutes
:00~:00 6 buses operation
- 6) Drivers shall check bus passengers at bus stops. If there is any passenger, stop and let a passenger ride. In case, obviously there is no passenger, it is possible to pass the bus stop.
- 7) After a certain period passes, increase the number of bus stops upon passengers' responses. It is recommended to install at where passengers are willing to use, for instance, at the corner of passage.
A target of distances of bus stops can be set at 500m, and 23 bus stops are required for route no.29.

Ref) Calculation of travel time between bus stops on the route

Distance between bus stops / Distance of the whole route (one way) * Travel time of the whole

route (one-way) [Round down to the nearest decimal]

Ex) No.29: CBS~Dongdok (12km, 40minutes), in case install bus stops every 500 m,

$$500\text{m} / 12,000\text{m} * 40 \text{ minutes} = 1.6 \text{ minutes} \rightarrow 1 \text{ minutes}$$

Note: Round down reduces risk of earlier departure than the designated time.

This is "Dongdok Bus Stop".

【RouteNo.】 NO.29 CBS~DONGDOK

【For】CBS(Central Bus Station)

【Fare】 3, 000KIP

Timetable

Hour	Minute							
6								
7	10	25	40	55				
8	10	25	40	55				
9	10	25	40	55				
10	10	25	40	55				
11	10	25	40	55				
12	10	25	40	55				
13	10	25	40	55				
14	10	25	40	55				
15	10	25	40	55				
16	10	25	40	55				
17	10	25	40	55				
18	10							
19								

Timetable shows approximate departure times.

Depend on the traffic conditions, buses would be delay.

Revised on 16 May, 2014

This is "●●● Bus Stop"

【RouteNo.】 NO.29 CBS~DONGDOK

【For】For CBS(Central Bus Station)

【Fare】 3, 000KIP

Timetable

Hour	Minute			
6				Departure time of the first bus
7	20	35	50	
	[Case1: Number of Vehicles]		[Case2: Headway Time]	
8	4 Vehicles per hour			Every 15 to 20 minutes
9				
10				
11				
12				
13				
14				
15				
16				Departure time of the last bus
17				
18	05	20		
19				

Depend on the traffic conditions, buses would be delay.

Revised on 16 May, 2014

**BUS
NO. 1**

29Dongdok

Dep. 06 : 25
Arr. 18 : 40

CBS **Check Point ①** **Check Point ②** **Dongdok**

	3.5km →11min 12min←	4.5km →15min 15min←	4.0km →14min 13min←	Total 12km →Total 40min
6.30	6.25 5 (5+0)	6 41	6 56	7.10
7.50		7 28	7 23	
8.15	25 (5+20)	8 26	8 41	8.55
9.35		9 23	9 08	
10.00	25 (5+20)	10 15	10 26	10.40
11.20		11 08	10 53	
11.45	25 (5+20)	11 56	12 11	12.25
13.05		12 53	12 38	
13.30	25 (5+20)	13 41	13 56	14.10
14.50		14 38	14 23	
15.15	25 (5+20)	15 26	15 41	15.55
16.35		16 23	16 08	
17.00	25 (5+20)	17 11	17 26	17.40
18.20		18 08	17 53	

For Your Reference: Wage of KEISEI Bus Drivers

1) Income and Expenditure of KEISEI Bus (FY 2013)

Income	100%	
Breakdown	Fare Income	96%
	Others	4%
Expenditure	94%	
Breakdown	Personnel Expenditure	46%
	Fuel and oil	9%
	Depreciation	8%
	Other	27%
	Administrative Expense	4%
Benefit	6%	

2) Wage balance of KEISEI Bus Driver

Items	Contract Employee	Permanent Employee
Basic Salary	67%	53%
Over time	25%	22%
Allowance	0%	10%
Bonus	8%	17%
Total	100%	100%

3) Labor Regulation in Japan

- Working hours exceeding 8 hours are defined as over time. More than 25% premium allowance shall be paid for the overtime.
- More than one day off per week is obligated.
- Drivers' wage is a fixed salary, not a payment upon the number of passengers.
- Rest hours are not counted as over time.

4) Labor Regulation of KEISEI Bus

- During three years after joining the company, a driver is a contract employee. After three years, the driver contracts as permanent employee.
- A salary of contract employee does not increase, whereas a salary of permanent employee increases according to working years.
- Drivers get bonuses two times a year, in July and December. The amount of the bonus is determined upon performance evaluation of each bus driver. Evaluation criteria are such as absence, tardy, alcohol, accident, complaint from passengers, attitude toward passengers, etc.

5) Reference

[Average of KEISEI Bus Drivers' Annual Salary]

Contract Employee: About 18,000 times as much as fare rate

Permanent Employee: About 25,000 times as much as fare rate

[Average of KEISEI Bus Drivers' Daily Salary]

Ex) Ride on a bus of No.29, with 10hours and 30 minutes working time, 7 trips and 168km drive.

The driver's daily salary is equivalent to about 70 passenger fare.

Photos



App4 Workshop Materials

Act 2-3 Set Criteria to Evaluate Bus Service and Target Levels of Public Bus Service

No.	Date	Seminar / Workshop	Page
1	1 Mar, 2012	Presentation of Bus Service Quality No.1	App4-297
2	2 Apr, 2013	Presentation of Bus Service Quality No.2	App4-304
3	4 Feb, 2014	Bus Service Improvement: On-time Operation at Bus Stops	App4-309
4	4 Feb, 2015	Criteria to Measure Level of Service	App4-314

Presentation of Bus Service Quality

Date: 1 March, 2012, Thursday, 2:00pm

Place: VCSBE Meeting Room

Agenda

1. Presentation of Bus Service Quality
Mr. KUNIMASA Yoshiro
2. Discussion

Registration

Meeting Topic:

Place: VCSBE Meeting Room

Date: 01 March 2012

Time:

ວ/ດ No.	ຊື່ ແລະ ນາມສະກຸນ Name & Surname	ຕຳແໜ່ງ Position	ມາຈາກພາກສ່ວນ Organization	ເບີໂທລະສັບມືຖື Telephone number	ທີ່ຢູ່ອີເມວ Email Address	ລາຍເຊັນ Signature
1	Mr.Khamphoune TEMERATH	Director	VCSBE			
2	Mr. Bounpone FONGMANY	Deputy director	VCSBE			
3	Mr. Buapha PHETVISAY	Deputy director	VCSBE			
4	Mr. Vanly CHANCHALERN	Deputy director	VCSBE			
5	KUNIMASA Yoshiro	Vice Team Leader/ Bus Service/ Human Resource Development 2	JICA Study Team			
6	Mr. Pannha VIRATHAM	Planing Section	VCSBE			
7	Mr.Bounngu THAMMASARD	Personen Section	VCSBE			
8	Mr.Khamsean Vilasack	Chief of Technical Section	VCSBE			
9	Mr.Bounma Vilavong	Chief of Personen Section	VCSBE			
10	Mr.Duangta Southkhamhak	Admin	VCSBE			
11	Ms. Chansouk Chanthavong	Deputy Chief of Finance Section	VCSBE			
12	Mr. Bounsouk Sibounthan	Chief of Technical Section	VCSBE			
13	Mr. Somlith Khankeo	Chief of Technical Section	VCSBE			

Registration

Meeting Topic:

Place: VCSBE Meeting Room

Date: 01 March 2012

Time:

ລ/ດ No.	ຊື່ ແລະ ນາມສະກຸນ Name & Surname	ຕຳແໜ່ງ Position	ມາຈາກພາກສ່ວນ Organization	ເບີໂທລະສັບມືຖື Telephone number	ທີ່ຢູ່ອີເມວ Email Address	ລາຍເຊັນ Signature
14	Mrs. Manyone PHENGPANGSAVATH	Marketing, Planning Section	VCSBE			
15	Mr. Khamphay SUVADDY	Transportation Section	DPWT			
16						
17						
18						
19						
20						
21						
22						
23						
24						



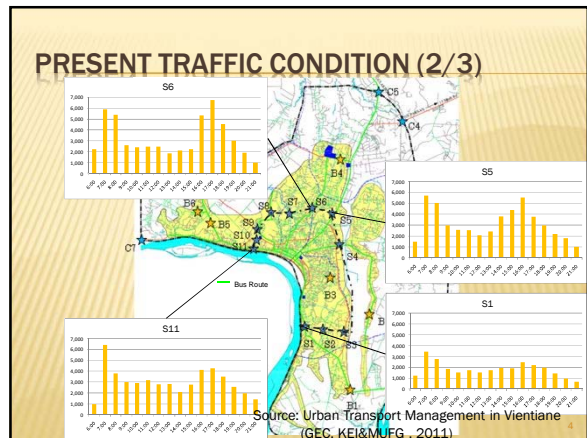
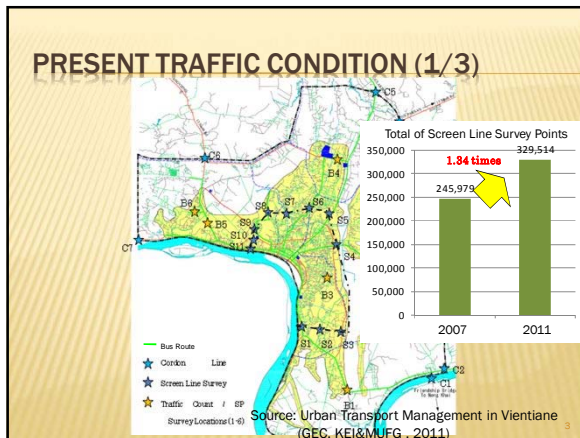
THE PROJECT TO ENHANCE THE CAPACITY OF VIENTIANE CAPITAL STATE BUS ENTERPRISE

BUS SERVICE QUALITY

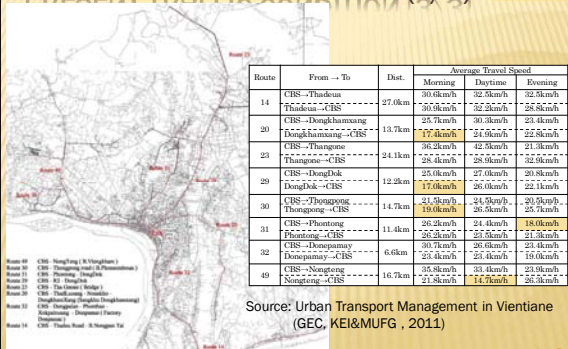
KUNIMASA Yoshiro

CONTENTS

- ✘ Present Traffic Condition in Vientiane
- ✘ Quality Management
- ✘ Necessity of Monitoring
- ✘ Data Collection
- ✘ Analysis of On Board Survey/ Opinion Survey
 - * Conducted on 10th August, 2010



PRESENT TRAFFIC CONDITION (3/3)



Route	From - To	Dist.	Average Travel Speed		
			Morning	Daytime	Evening
14	CBS - Phoukhouang Phoukhouang - CBS	27.0km	20.6km/h 20.6km/h	22.5km/h 22.5km/h	22.5km/h 22.5km/h
20	CBS - Dongkhamxang Dongkhamxang - CBS	13.7km	25.7km/h 17.6km/h	30.3km/h 24.9km/h	23.4km/h 22.5km/h
23	CBS - Phouang Phouang - CBS	24.1km	36.2km/h 24.4km/h	42.5km/h 26.5km/h	21.3km/h 22.5km/h
29	CBS - Dongdok Dongdok - CBS	12.2km	25.0km/h 17.0km/h	27.0km/h 20.0km/h	20.8km/h 22.1km/h
30	CBS - Phonsong Phonsong - CBS	14.7km	21.5km/h 18.0km/h	24.5km/h 25.5km/h	20.5km/h 22.7km/h
31	CBS - Phonsong Phonsong - CBS	11.4km	26.3km/h 20.2km/h	24.4km/h 21.5km/h	18.0km/h 21.5km/h
32	CBS - Doungpaysay Doungpaysay - CBS	6.6km	30.7km/h 25.4km/h	26.6km/h 21.4km/h	23.4km/h 19.0km/h
49	CBS - Neangse Neangse - CBS	16.7km	35.8km/h 21.8km/h	33.4km/h 14.7km/h	23.5km/h 26.5km/h

Source: Urban Transport Management in Vientiane (GEC, KEI&MUFG, 2011)

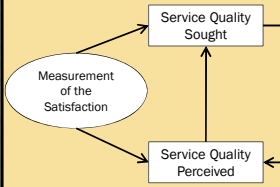
QUALITY MANAGEMENT (1/2)

- ✘ Good Service Attracts Users
- ✘ Proper Frequency, Punctuality, Information of Operation
- ✘ Evaluate Bus Service from Both "Service Provider View" and "Customer View"
- ✘ Service Quality Target -> Operation Monitoring -> Evaluate -> Improve

QUALITY MANAGEMENT (2/2)

Service Quality Loop

Customer View



Service Beneficiaries
Customers and the Community

Service Provider View



Service Partners
Operator, Authorities, Police, Road Department ...

Source: EN 13816: 2002

NECESSITY OF MONITORING

- ✦ To Evaluate System's Performance
 - ✦ To Identify Present Problems
 - ✦ To Provide More Effective Public Transportation Services
- > Medium-term Public Bus Transportation Plan

DATA COLLECTION

- ✦ Ridership Data
 - > On Board Survey (VCSBE)
- ✦ Travel Time and Delays
 - > Record Actual Operation Records (VCSBE)
 - * On Board Survey can verify the record
- ✦ Origin - Destination Patterns
 - > To Assess the Adequacy of Present Network (DPWT/ VC)
- ✦ Travel Needs and Attitudes Information
 - > 1) Interview at Households (DPWT/ VC)
 - 2) Interview with Bus Users (DPWT/ VC, VCSBE)
- ✦ Bus Drivers' Suggestions

ANALYSIS OF ON BOARD SURVEY (1/6)

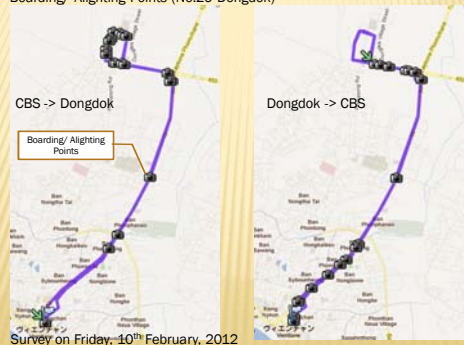
On Board Survey Sheet (No.14 Thadeua)

Inventory Sheet for Bus Route (No. 14 / 14)															
Bus No. 14	Line	Start Date	End Date	Start Time	End Time	Length	2 Max	Station No.							
Bus Type	Name	Time	Route	Passenger Number				Loading				Backlog/Carriers			
No.	Name	Time	St	W	W	Stater (W)	W	W	Stater (W)	W	W	Stater (W)	St	Stater	Carriers
1	Bus station	5:58	502	4	4					4	0	0	4	0	0
2	B. PHANOMIN	6:00								3	4	0	0	0	0
3	B. NHAHAI	6:15						2		3	2	0	0	0	0
4	Phnom slip bridge	6:25	502				3	3		0	0	0	0	0	0
5	B. PAVAH	6:31			1					0	0	0	0	0	0
6	B. THINTOM	6:37	502		1					0	2	0	0	0	0
7	B. NONKAPAN	6:39						1		0	1	0	0	0	0
8	B. XIEMKHEAN	6:45						1		0	0	0	0	0	0

Survey on Tuesday, 10th August, 2010

ANALYSIS OF ON BOARD SURVEY (2/6)

Boarding/ Alighting Points (No.29 Dongdok)



ANALYSIS OF ON BOARD SURVEY (3/6)

Summary of On Board Survey Result (No.14 Thadeua)

Code	CBS-Thadeua				Thadeua-CBS					
	CBS Departure Time	Arrival Time	Travel Time	Number of Passengers	Maximum Loading Passengers	Departure Time	CBS Arrival Time	Travel Time	Number of Passengers	Maximum Loading Passengers
R14_1_1	5:50	6:45	0:55	10	8	6:45	7:32	0:47	18	17
R14_1_2	8:15	9:11	0:56	26	24	9:11	10:16	1:05	30	23
R14_1_3	10:45	11:41	0:56	28	28	11:41	12:50	1:09	22	19
R14_1_4	13:20	14:13	0:53	29	29	14:16	15:20	1:04	21	18
R14_1_5	16:05	17:16	1:11	25	25	17:16	18:13	0:57	10	7
R14_2_1	6:00	6:47	0:47	5	5	7:00	8:03	1:03	22	16
R14_2_2	8:29	9:25	0:56	31	25	9:33	10:32	0:59	37	29
R14_2_3	11:00	12:00	1:00	35	32	12:05	13:08	1:03	32	29
R14_10_1	7:45	8:45	1:00	45	35	8:50	9:50	1:00	28	24
R14_10_2	10:19	11:10	0:51	34	27	11:20	12:25	1:05	31	31
R14_10_3	12:45	13:38	0:53	44	43	13:52	14:45	0:53	18	18
R14_10_4	15:43	16:37	0:54	36	33	16:40	17:40	1:00	26	26
			Average	Total	Max			Average	Total	Max
			0:56	1,430	45			1:03	1,041	31

Survey on Tuesday, 10th August, 2010

Average Passengers (Round Trip) = 57.5 persons

ANALYSIS OF ON BOARD SURVEY (4/6)

Headway of Departure at Terminals (No.14 Thadeua) Unit (Hour: Minute)

Route No.14 Thadeua	5:00-6:00	-7:00	-8:00	-9:00	-10:00	-11:00	-12:00	-13:00	-14:00	-15:00	-16:00	-17:00	-18:00	Total
CBS → Thadeua	Ave.	0:50	0:53	0:55	0:55	0:56	0:59	0:55	0:55	0:55	0:55	1:02	0:59	0:56
	Max	0:53	0:56	1:00	0:57	0:58	1:00	1:07	0:59	1:02	1:03	0:55	1:11	1:04
Thadeua → CBS	Ave.	-	0:55	1:07	1:00	1:02	1:04	1:06	1:04	1:02	1:10	1:04	1:00	1:03
	Max	-	1:03	1:18	1:01	1:05	1:10	1:08	1:10	1:13	1:05	1:18	1:09	1:04

Survey on Tuesday, 10th August, 2010

Recording of actual operation can provide this information

ANALYSIS OF ON BOARD SURVEY (5/6)

Punctuality of CBS Departure (No.14 Thadeua)

Code	Plan	Actual	Gap	Code	Plan	Actual	Gap
R14 1 1	5:35	5:50	0:15	R14 5 4	14:05	14:25	0:20
R14 1 2	8:05	8:15	0:10	R14 5 5	17:30	-	-
R14 1 3	10:35	10:45	0:10	R14 6 1	6:50	7:20	0:30
R14 1 4	13:05	13:20	0:15	R14 6 2	9:20	9:50	0:30
R14 1 5	16:05	16:05	0:00	R14 6 3	11:50	12:14	0:24
R14 2 1	5:50	6:00	0:10	R14 6 4	14:25	15:00	0:35
R14 2 2	8:20	8:29	0:09	R14 7 1	7:05	-	-
R14 2 3	10:50	11:00	0:10	R14 7 2	9:35	9:35	0:00
				R14 7 3	12:05	12:05	0:00
				R14 7 4	14:45	14:45	0:00
				R14 8 1	7:20	8:06	0:46
				R14 8 2	9:50	10:35	0:45
				R14 8 3	12:20	13:05	0:45
				R14 8 4	15:05	16:05	1:00
				R14 9 1	7:35	7:33	0:02
				R14 9 2	10:05	9:59	0:06
				R14 9 3	12:35	12:25	0:10
R14 4 3	11:20	11:35	0:15	R14 9 4	15:25	15:25	0:00
R14 4 4	13:50	14:05	0:15	R14 10 1	7:50	7:45	0:05
R14 4 5	17:05	17:30	0:25	R14 10 2	10:20	10:19	0:01
R14 5 1	6:35	6:50	0:15	R14 10 3	12:50	12:45	0:05
R14 5 2	9:05	9:20	0:15	R14 10 4	15:45	15:43	0:02
R14 5 3	11:35	11:50	0:15				

Operating Ratio = 95 %
Average Delay = 15 minutes
Max Delay = 60 minutes
Punctuality Ratio = 44%
* Less than 15 minutes Delay

Survey on Tuesday, 10th August, 2010

ANALYSIS OF ON BOARD SURVEY (6/6)

Passengers (No.14 Thadeua) Unit (Persons)

Route No.14 Thadeua	5:00-6:00	-7:00	-8:00	-9:00	-10:00	-11:00	-12:00	-13:00	-14:00	-15:00	-16:00	-17:00	-18:00	Total
CBS → Thadeua	Ave.	8	21	37	29	32	35	40	41	38	34	41	32	41
	Max	10	24	45	34	37	41	46	47	46	40	41	37	41
Thadeua → CBS	Ave.	-	20	24	28	31	25	27	28	22	26	21	23	17
	Max	-	22	31	30	37	30	31	36	25	32	24	25	21

Survey on Tuesday, 10th August, 2010

ANALYSIS OF OPINION SURVEY (1/2)

Opinion Survey Sheet

I. ABOUT YOURSELF

1. Sex: 1. Male 2. Female
2. Age: 1. <19 2. 20-29 3. 30-39 4. 40-49 5. 50-59 6. >60
3. Educational Background: 1. Primary School 2. High School 3. University/College 4. Vocational Training 5. None
4. Working Status: 1. Working 2. Studying (Univ./Col.) 3. Schooling 4. Housewife 5. Jobless 6. Retired
5. How much are you earning per month? (Kip/month) (Family Income)
6. How many car or Motorcycle do you have ?

II. ABOUT THIS TRIP

7. Where did you start this trip?
8. Where will you end this trip?
9. What is the purpose of this trip?
1. To Home 2. To Work 3. To School 4. Business 5. Private 6. Others
10. How do you access and egress mode to/from bus stop?
10.1 Access: Mode _____, Time _____ minutes
10.2 Egress: Mode _____, Time _____ minutes
1. Walking 2. Bicycle 3. Motorcycle 4. Tuk Tuk 5. Bus 6. Others (Please specify _____)

III. OPINION ON BUS SERVICE

11. What is your assessment of present Bus service?
1. very good 2. good 3. fair 4. bad 5. very bad

12. What is your assessment of present Bus service?
1. Travel time/speed 1. 2. 3. 4. 5.
2. Waiting time 1. 2. 3. 4. 5.
3. Punctuality 1. 2. 3. 4. 5.

ANALYSIS OF OPINION SURVEY (2/2)

Access Mode	-5 minutes	-10 minutes	-15 minutes	-20 minutes	-30 minutes	-40 minutes	-50 minutes	-60 minutes	more than 1h	Total
Walking	1	4	1	0	0	0	0	0	0	6
Bicycle	0	0	1	0	0	0	0	0	0	1
Motorcycle	0	6	1	6	4	1	0	1	0	19
Tuk Tuk	0	3	11	1	1	0	1	0	1	21
Bus	0	3	9	34	84	30	18	36	38	252
Others	0	0	0	2	0	0	0	0	0	2
Total	1	16	23	43	89	31	19	38	41	301

Egress Mode	-5 minutes	-10 minutes	-15 minutes	-20 minutes	-30 minutes	-40 minutes	-50 minutes	-60 minutes	more than 1h	Total
Walking	0	4	0	0	0	0	0	0	0	4
Bicycle	0	0	0	0	0	0	0	0	0	0
Motorcycle	0	1	0	1	2	0	3	0	0	7
Tuk Tuk	0	0	1	1	0	2	1	1	0	6
Bus	1	6	4	35	97	47	40	23	27	280
Others	0	1	0	0	1	1	1	0	0	4
Total	1	12	5	37	100	50	45	24	27	301

- ### RECOMMENDATION
- ✦ Record Actual Operation
 - ✦ Record Operation Plan/ Record in Computerized Format
 - ✦ Utilize Driver's Opinion

Photos

